Journal of Experimental Education

Volume VII | December, 1938 | Number 2

A PRELIMINARY STUDY OF QUESTIONS WHICH ADOLESCENTS FIND UNANSWERABLE

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How shall we evaluate an educational process or an educational system? Do we want:

1. Students who have no questions to ask because the school has given them all the answers?
2. Students who have no questions to ask because the school has consistently thwarted and penalized questioners, so that intellectual curiosity has died a slow and unnatural death?
3. Students who go forth with a diploma and hundreds of unanswered questions because the school has been afraid or unable to provide answers?

Obviously, this is not a fair list of alternatives or a complete one. There is a fourth possibility. But to state it now would be to run ahead of my story, as well as to oversimplify the way in which the entire problem presented itself to me originally.

Four years ago, I began collecting questions as a kind of hobby. A mimeographed form was prepared asking for "Questions to Which I Have Tried to Find a Satisfactory Answer and Failed." This form contained a brief description of the purpose of the inquiry and asked for data on age, sex, date of filling out, school grade, self-rating of scholastic achievement, types of books read, radio programs listened to, and concluded with a space for comments, either on the form itself or on anything else that occurred to the person filling out the form. Subjects were given to understand that any particular piece of information might be withheld if it was so desired. They also were told that questionless forms and those with questions were equally valuable. Next, they were informed that there were no silly questions; anything which had genuinely baffled them was precisely the thing that was wanted. Finally, they were cautioned that they were not to expect answers. Forms were filled out in class or at home and were turned in anonymously.

The blanks have been given thus far to a grand total of 807 persons, ranging in age from 6 to 71. Of these persons, roughly 25% returned them without questions. The remainder, 602 cases, furnished a total of 1514 questions. A separate analysis will be published at some future time of those persons who had no questions. Separate reports also will be made on the age periods 6 to 13, 19 to 39, 40 to 79 whenever sufficiently adequate data on these age ranges has been collected.

The present report limits itself to the age range 14 to 18 inclusive. While forms were given to 559 adolescents, 174 returned them without questions. This leaves 385 cases, 174 boys, 211 girls, who asked 990 questions. The subjects, for the most part, were students of Evander Childs High School, selected at random.

At the adolescent level, then, we have the following data:*

Table I

Distribution of Cases as to Sex and Age

Age	No. Male	No. Female	Totals
14	29	71	100
15	46	72	118
16	56	57	113
17	33	10	43
18	10	1	11
Total	174	211	385

* A paper delivered at one of the Educational Research Symposia of the High School Teachers and High School Principals Associations February 26th, 1938.

* This paper is called a preliminary study in view of the small number of cases, especially marked at ages 17 and 18, and also because of the preponderance of girls in the total sampling. However, the significance and usefulness to teachers of the unanswerable question technique as developed in the latter part of this paper, is independent of the number of cases or the precise questions which were asked.

TABLE II

DISTRIBUTION OF QUESTIONS AS TO SEX AND AGE

Age	Total Questions	No. of Questions by girls	No. of Questions by boys	Questions per boy	Questions per girl	Questions per Individual
14	254	174	80	2.8	2.5	2.5
15	323	206	117	2.6	2.9	2.7
16	279	159	120	2.2	2.8	2.5
17	114	29	85	2.6	2.9	2.7
18	20	4	16	1.6	4.0	1.8
Total	990	572	418	2.3	3.0	2.5

TABLE III

QUESTIONS ARRANGED ACCORDING TO FREQUENCY AND AGE

Age 14

		Times asked
1.	Why are we born, what use is life	13
2.	What makes people unkind, selfish, etc.	9
3.	What is love, platonic love, true love	7
4.	Is there a God	6
5.	Is there such a thing as reincarnation	5
6.	What happens to us (our souls) after we die	5
7.	Why should there be wars, why do people go to war	4
8.	Why does a new scene seem to have happened before	4
9.	What makes the world rotate and why don't we feel it	4
10.	Why must Man worship something	3

Age 15

		Times asked
1.	What is love, at first sight, real love, etc.	30
2.	Is there a God and who is He	13
3.	What happens after death	13
4.	What makes people boast, be unkind, etc.	11
5.	What is life, why do we live	8
6.	What is religion, why do we have it	7
7.	What is social popularity, how does one get it	7
8.	Will the world ever end, how	6
9.	What makes teachers mechanical, cranky, etc.	6
10.	Is there reincarnation	5

Age 16

		Times asked
1.	What is love	13
2.	What is life, why are we living, what worth is life	10
3.	What will my future be	9
4.	Is there a God, what is God	7
5.	Is there a hereafter	7
6.	What is death, and why are we afraid of it	6
7.	Are childish fears carried through life, why do we fear	6
8.	What is religion	6
9.	Is the Bible true	5
10.	What makes happiness—no worries, money, success, etc.	5

Age 17

		Times asked
1.	What will be my life work, future	5
2.	What is love	5
3.	Is there a God	3
4.	What makes people selfish, cheat, etc.	3
5.	What is life, why do we live	3
6.	How to develop personality	2
7.	Why are history readings necessary	2
8.	What makes people drag nationalities into sports, politics	1
9.	How can racial prejudice be overcome	1
10.	Why do parents pick one child for pet child	1

Age 18

		Times asked
1.	Why do teachers act superior to pupils	2
2.	What is God	1
3.	Is there a hereafter	1
4.	Are there any honest people in the world	1
5.	Why are men and women false to themselves	1
6.	Is there such a thing as true love	1
7.	Why don't schools permit students to take the subjects they like	1
8.	What is "Nothing"	1
9.	What is courage	1
10.	Does every advantage have its disadvantage and vice versa	1

TABLE IV

QUESTIONS ACCORDING TO FREQUENCY-ENTIRE ADOLESCENT PERIOD

(Based on 990 questions, 572 asked by girls, 418 by boys)

		Times asked
1.	Love	55
2.	God	30
3.	Death	24
4.	Criticisms of people in general	23
5.	Life	22
6.	Future	21
7.	The hereafter	21
8.	Religion	14
9.	Reincarnation	11
10.	The end of the world	11

TABLE V

20 QUESTIONS SELECTED FROM THE ENTIRE ADOLESCENT GROUP*

1. Although people continued to suffer during and after wars, we continue to have them, and no one seems to stop them. Why? 14G
2. Why can't the same government control all the peoples of the world? 14G
3. What do people get out of life when they don't give anything? 14G
4. Why don't they teach sex in school? 14B
5. Are our lives planned for us or do we do things because we want to or because we are compelled to? 15G
6. Why should parents never give us the satisfaction of saying that we understand what is going on in the world about us, as in politics, religion, etc., and tell us that we are too young to understand? 15G
7. Why do parents feel, that if they give you the proper amount of clothes and money that you owe them something for the rest of your life? When something is done that the parents think shouldn't have been done, they immediately bring it up to you that they gave you everything you wanted and needed. It's true as far as clothes and money go, but have they ever given the child the right amount of happiness and love? When this is told to them, they just can't understand it and say the child is spoiled. Why are most parents that way? 15G
8. Would people be happy if they had what they desired? 15G
9. Can young people in adolescence really love? 15B
10. Is it very necessary to consider religion before marrying? 16G
11. Could the world get along with everybody believing in the same thing? 16G
12. How can a young person learn to mix in with any groups of people? 16G
13. Why are parents slow in granting their first child privileges? 16G
14. Did Shakespeare really write his books? 16G
15. Why do we have girls in this world? 15B
16. Why are the wild animals so ferocious (can they be civilized)? 17B
17. Why does grass grow into grass and not trees (why does it keep its form)? 17B
18. Why is it that the code of morals which the younger generation of today seems to have worked out would shock the generation of 50 years ago? 17B
19. Why should one's mark depend on two hours of excitement of an examination? 17B
20. Who was the greatest baseball pitcher of all time? 14B

* This list represents the author's own selection of interesting and challenging questions; these are atypical questions. Numeral after question means age of questioner, letters B and G mean boy and girl respectively.

The object of this paper is to present the chief types of questions of adolescents as a class, though the small number of cases (385) does not permit of any final interpretation. A second purpose of the study is to determine whether the kind of question changes from year to year within the adolescent period itself. The questions were therefore classified under the following rubrics:

1. Philosophic and religious questions (speculative questions, questions dealing with matters of faith, belief and value, ethics, origin of things, etc.)
2. Psychological questions (human nature, mental processes, emotions).
3. Questions about family relationships.
4. Questions about school, teachers, education, etc.
5. Questions about sex.
6. Questions dealing with social, political, economic matters.
7. Questions about natural science.
8. Miscellaneous (not classified in foregoing groups).

Of course, this scheme is an arbitrary and subjective one. Another investigator might easily set up other categories. I myself could. This aspect of the study has been the most difficult, especially since the same question often fits into several categories. However, it is hoped that eventually all the questions themselves will be published in the exact form in which they were received. This will make it possible for other interpreters to deal differently with the material.

TABLE VI

QUESTIONS CLASSIFIED ACCORDING TO TYPE AND AGE

Age 14

1. Human Nature	32.3%
2. Religion and Ph.	25.20
3. Science	17.7
4. Politics	9.1
5. Sex	5.5
6. School	4.73
7. Family	2.4
8. (Misc.	3.2)

Age 15

1. Human Nature	32.8%
2. Religion and Ph.	25.7
3. Science	14.6
4. Sex	12.08
5. School	6.5
6. Politics	5.3
7. Family	1.9
8. (Misc.	1.2)

Age 16

1. Human Nature	34.75%
2. Religion and Ph.	27.3
3. Science	12.6
4. Sex	10.8
5. School	7.5
6. Politics	2.15
7. Family	1.1
8. (Misc.	3.9)

Age 17*

1. Human Nature	46.5%
2. Religion and Ph.	21.1
3. Sex	9.7
4. School	7.9
5. Science	7.9
6. Family	3.5
7. Politics	1.8
8. (Misc.	1.8)

Age 18*

1. Religion and Ph.	35.0%
2. School	35.0%
3. Human Nature	10.0
4. Family	10.0
5. Sex	10.0

Entire Adolescent Group

1. Human Nature	34.4%
2. Religion and Ph.	25.7
3. Science	13.8
4. Sex	9.7
5. School	7.1
6. Politics	4.9
7. Family	2.1
8. (Misc.	2.5)

* See footnote Page 2.

If the 990 questions which have been collected so far are fairly representative of the matters about which adolescents everywhere are currently curious, what use can we make of this curiosity in our educational procedures? I have some suggestions in this connection. Of their merits and feasibility you will have to be the judges.

A blank similar to the one employed in this study could be distributed to the entire population of a given school once every few years. Schools in different areas or the same school at different times, because of changing events and pressures in the contemporary scene, may yield a somewhat different sampling of questions. The questions, obtained under circumstances conducive to reliable results, would be classified as to the nature of the answer required. They then would be allotted to the appropriate subject-matter department and serve as the basis of class assignments developed in whatever manner seemed most desirable to the classroom teacher. Many of the factual questions will fit easily into the various subjects now part of the curriculum: the natural and social sciences, especially. Others, those of a speculative nature mainly, might be handled in the English class.

Probably the simplest way of employing this device is for the teacher of a given subject-class to distribute the blanks to his own students and to then select those questions most relevant to his own course of study.

A final method, while valuable in itself, is only remotely connected with this device of unanswerable questions. It involves having the student conclude as many assignments as possible with a question which has arisen in connection with the work which he has just done. Some of the questions thus obtained could be treated in the same manner as those furnished by the previously described techniques.

However, regardless of the way that the questions are obtained, the most important aspects of the whole matter are the subsequent procedures. The teacher must not let any prior conceptions cause him to reject certain questions as trivial. Any question asked in good faith is legitimate. Of course, legitimate questions may be worded very poorly. There is an art to framing questions. It may often be necessary, then, to put the question differently, perhaps breaking it up into several smaller questions to be answered serially or concurrently.

So much for the questions. Now for the answers. To many questions, among these the most important ones, there is not one answer, there are several, sometimes an infinite variety. Proper devices for obtaining a very large sampling of answers is necessary. A teacher cannot decide in advance of the verifying process, that any given answer is good, bad or indifferent, though he may have his suspicions. For the validity of all answers comes as the final product of evaluation according to various criteria set up in advance of the consideration of any particular question. Standards of reliability remain fixed for a given type of question and are not to be thrown over-board because teacher or pupil does not relish the drift of the evidence. It is the teacher's role to instruct young people in the technique of controversy: how

to frame questions, how to find answers, how to develop a measuring rod for determining the answer which seems best in light of the facts, or, if there are several equally valid answers, how to select the answer which best meets the personal requirements of the student.

You may be interested in a sample exercise employed in some of the English classes at Evander Childs with considerable success. These were the instructions which the student received:

1. State the question as you first framed it and outline your original plan for finding an answer.
2. Describe how you modified the question and your plans for arriving at an answer, once you started work.
3. Giving your answers a definite number or letter, list them one by one, being sure to tell where they came from.
4. Referring by number or letter to your answers, tell which ones you rejected and give specific reasons for your rejection. Tell how they failed to live up to your standards of truth or how they are guilty of one reasoning weakness or another.
5. Present your own choice among the answers, and tell how it escapes the weaknesses of your rejected answers.

Such an assignment is a very severe test of the teacher's store of information and logical powers, as well as of his ability to be sympathetic, good-natured and objective toward questions that may emotionally disturb him or toward answers that are unendurable, especially unendurable because true.

Some new courses will have to be created if the fullest possibilities of the unanswerable question technique are to be realized. There is apparently a great demand for information concerning human nature, notably personality and emotional problems, and sex, love and marriage relationships. Perhaps there should be a systematic and detailed unit of study in elementary psychology and in mental hygiene and sex hygiene. Whether these are taken up in the biology class or in three distinct courses must be decided by the administrative authorities, though I prefer separate courses with specially prepared instructors. There is also a considerable need for an elementary course in the great philosophic systems. I am quite sure that many philosophers and philosophies can be so taught as to be understood by high school students. In like manner, I believe young people would appreciate an objective and factual treatment of the chief religions of the world. The greatest drama of human beings is the attempt to piece together the fragmentary events that happen to them and the things that they see into some sort of coherent philosophy of life. The basic questions of all individuals deal with the three main areas of human interest and striving: the relation of man to the universe, to other men and to himself. Young people want to know what you and I want to know: the riddle of life's origin and meaning, what people need in order to be happy, how to make a success of friendship, love and marriage, the purpose of suffering and death, how differences among races, religions, parties, nations can be reconciled; or, if they cannot be reconciled, how we can learn to accept the varied expressions which life, people and opinion take, without wanting to destroy the differences or the individuals who exhibit the differences.

Such elementary courses in philosophy and religion would provide keen pleasure for young people and would nourish a deep hunger. But such courses would also present a vexing administration problem. *Yet this very fact is the best argument for their creation.*

We teachers are apt to be more interested in the logical presentation of a given subject-matter than in discovering whether the subject-matter has any relevance to the needs of young people. I am not now referring to the emotional needs of students which we either ignore or deem unimportant. Elsewhere I have tried to outline a dealing for bringing the emotional lives of young people into the classroom.* Here I refer to the intellectual needs of the child—the very area which we believe we have preempted for our own and are cultivating so exhaustively. We are prone to tell children what *we* think they ought to know or what *we* believe they want to know, instead of first assuring ourselves that they really want to learn what we are trying to have them learn or whether there are things about which they would welcome information.

* "Mental Hygiene through Procedures in the English Classroom" published in the 1937 *Yearbook of the New York Society for the Experimental Study of Education.*

The best learning is an attempt to meet a felt problem or difficulty in the learner's own experience. That is what we mean by motivation and both you and I believe we apply it daily. But this business of developing a problem for a child in contemporary educational practice is often no more than a technical maneuver designed to make more palatable a learning potion which we have compounded in advance. For the particular motivating problem, worked out in terms of the logical structure of the lesson, may or may not be one among the current perplexities of the child. While logically valid, it is psychologically false. If we have selected wisely, our success has been a chance affair. What we want is to be able to visit the inner world of childhood every day in every lesson. For unless our subject-matter somehow becomes intertwined with the intellectual hungers of the child, he probably will soon forget what he has learned, if ever he learned.

I think it is the teacher's office to teach. We have the knowledge, or we have it in most instances, at least. Our pupils have the ignorance—an encyclopedic void. For a student to be given a passage or book to be studied and for the teacher to ask questions about the passage or book the following day seems to me a bizarre reversal of roles. For the most part, pupils should be the questioners and teachers the answerers. A teacher should occasionally come to class and say: "Is there anything you think I know that you would like to know?" If the teacher does raise questions, they should be of a type where only pupils have the answer since the matter deals with what young people think and feel and do about this or that. Another variety of good questioning procedure is where the teacher is genuinely perplexed and must think his way through to a correct answer in joint discussion with his students. I have always been puzzled at hearing a teacher raise a question, the answer to which he already knows with absolute and relentless finality.

A truly educational institution ought to furnish answers for certain questions and resolve certain perplexities of young minds. There is a body of information which ought to be the intellectual property of every educated adult. Students should know the differences between matters of fact and matters of belief, opinion and faith. They should not only be allowed and encouraged to ask their own questions but they should be goaded and aroused into raising other questions, some factual, other speculative, which may not have occurred to them, but which once heard or overheard become their own. Reading to them the questions of other young people is one way of doing this.

Teachers, like parents, should understand children better than they understand themselves. Teachers should know that the fully verbalized questions of young people, the problems which appear right on the surface, are important enough. But the thoughts without words are even more important. Through various means, young people should be led to formulate these vague and fugitive questions which can hang like invisible but dimly sensed swords over our heads for an entire life-time. There are certain questions which are the birth-right, if not the tragic and noble fate of every human being. John Stuart Mill said that it is better to be a dissatisfied human being than a satisfied pig; better to undergo the sufferings of a Socrates than to enjoy the pleasures of a fool. The quest for certainty, however trying and perilous, of a disciplined, sensitive mind is preferable to the luxurious peace of a smug, dull one.

Education is the attempt to minister to the various needs of young people. The unanswerable question technique is a useful one, I believe, for discovering and satisfying intellectual needs. It offers an elementary but searching type of training in scientific method. To raise questions openly, to select among a number of answers the one which best fulfills the requirements of experimental science, of unfettered logic, of enlightened belief—this is the mark of a free mind. Free minds are possible only in a free people. Are democracies, then, to be the only home for true scientific method?

This, however, is a rhetorical question; not an unanswerable one.

THE HIGH-SCHOOL GRADUATE AND DROPOUT

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THE PROBLEM AND ITS SCOPE

The purpose of the research is to make a comparative study of graduate and non-graduates (or dropouts) of high schools in the Metropolitan Area of New York City in terms of the educational and vocational adjustments which had been made during or subsequent to their school experience. It includes a study of the trends which were evident in the adjustments of youth.

The research is limited to students of schools offering the commercial or academic courses. It is limited to the period from June, 1934, to February, 1936. It is limited also to a study of those factors which are associated chiefly with educational and vocational adjustments.

The problem draws its chief importance from the need to evaluate the results of secondary school achievement, specifically focussed in this case upon the existing differences in adjustments between graduates and dropouts. The problem of evaluation becomes particularly important since the secondary-school is now in the process of absorbing into its student body a section of youth who have been forced into the school through lack of employment opportunities and a steadily rising compulsory school age. The fact that for the last few years the number of dropouts from this type of school has conservatively averaged 40,000 per year on the secondary-school level alone in the New York City school system, points to the reality of the problem.

LITERATURE ON THE PROBLEM

The review of the literature on problems related to the research revealed that leaders in education are agreed that the problem of the dropout is of serious and primary importance. Experts and research workers have stressed that while in school the dropout lacks interest in his school studies, needs guidance, may be a truant, and needs courses other than those for which he is enrolled. Out of school studies, limited to the employment status of the dropout, present conflicting evidence. Of five studies in this area, one found his status favorable when compared with others of his age group, four others, in varying degree, found his work history poorer than that of graduates. In the researches on the differences in adjustments between graduates and dropouts, differences are not noteworthy.

The literature on trends for youth as a whole reveals that generally youth desires more education, and that in securing employment the aid of friends or relatives, of the school, of the employment agency, is utilized in the order named. The consensus of opinion is that high-school training is valuable on the job. However, youths expressed regret that they did not have training in office machines, in handling people tactfully, and in conducting an interview. The three most common leisure time activities listed in the order of their importance are reading, listening to the radio, and going to the movies. There is decidedly contrasting evidence with respect to the employment of youth. One series of studies, best represented, perhaps, by the Youth Study of the New York City Welfare Council, presents a gloomy picture with 47 per cent of youth unemployed. Other studies, of which Pavan's Philadelphia study may be typical, find only some 18 per cent of youth unemployed.

PROCEDURE

There was obtained a random sample of students who had been graduated or had left the city's secondary schools during the period from June, 1934, to February, 1936.

Preliminary data, covering name, address, school, date of entering school, course taken, term graduated or dropped out, strongest and weakest subjects, grade average, and intelligence quotient, were obtained for 2,577 graduated and 1,387 dropouts, 4,044 students in all. During the summer of 1937, interviews were conducted by a staff of specially trained W.P.A. workers. Interviews were conducted

at the homes of the former students. The interview record contained the following information: name, address, school, course taken, whether course had been changed and for what reason, if not a graduate the last term completed, reason for leaving school, and age when leaving, subjects of most and least interest, education and employment since leaving school, subjects found most valuable for work, lack in preparation, present educational and vocational plans, relationship between present activities and educational and work plans, obstacles to carrying out plans, leisure time activities, vocational plans made while in school, and who assisted in making such plans.

Results

The interviewers secured 2,592 interviews or 64.09 per cent of the number available for interview. In recording the interviews, the data were treated so as to provide for eventual summaries for each main group in the study and for comparisons between groups. There were eight such groups as follows: (1) graduates, boys, general course, (2) dropouts, boys, general course, (3) graduates, girls, general course, (4) dropouts, girls, general course, (5) graduates, boys, commercial course, (6) dropouts, boys, commercial course, (7) graduates, girls, commercial course, and (8) dropouts, girls, commercial course. At the same time, summaries were made available for the total graduate as against the total dropout group, for the total commercial course as against the total general course group. The totals for all youth constituted data on trends for youth as a whole. In the routine of recording data, each entry representing an interview was indexed so that reference to the original interview sheet was possible.

The accompanying table (Table I) contains a summary of the differences between graduates and dropouts. Certain characteristics, however, need fuller treatment than the table affords. The treatment of intelligence quotients presented unforeseen difficulties. There were available I.Q.'s for 2,276 students of which, however, 1,213 were quotients derived from the Otis Test of Mental Ability, Higher Examination, Form A, and 1,063 were quotients derived from the Henmon–Nelson Test of Mental Ability, Form A. It was desired to group together both distributions, but wide inquiry disclosed no transmutation table anywhere available. A table for equating Henmon–Nelson I.Q.'s into "Otis-Equivalent" I.Q.'s was therefore organized by means of cumulative per cent frequency table plotted in the form of two large and very detailed ogives.

It will be noted from Table I that dropouts have more vocational plans while in school than graduates. However, the table cannot indicate the differences between the groups in types of vocational plans made in which graduates are superior. The general course dropout has made about one-seventh as many professional vocational plans as the general course graduate. He has four times as many commercial vocational plans as the graduate. The commercial course dropout has made one-fourth as many professional vocational plans as the commercial course graduate, while in commercial vocational plans he has made four times as many as the graduate.

Perhaps the most significant findings in trends for youth as a whole are contained in the data on employment. The overwhelming majority of students, 9 out of every 10 youths concerned in the study, were employed since leaving school. The average duration of such employment was 12.8 months. The average weekly pay was $14.40. Friends, own efforts, and those of families, in the order listed, seem the most important sources of placement. The majority of students do not have agreement between vocational plans made while in school and kind of work obtained but do have agreement between kind of course taken after high school and kind of work obtained. Other trends for youths are available from Table I.

The third important series of findings of the research dealt with the differences between students with differing aspects of a given one of a series of characteristics. Table II contains a summary of the major findings in this regard.

Conclusions

1. In view of the differences existing between graduates and dropouts, the conclusion follows that the adjustments of graduates are superior to the adjustments of dropouts. If graduation could be shown to be the causative factor in this respect, it would follow that graduation is to be sought by the high-school student and is to be encouraged by the high-school administrator.

2. No noteworthy differences exist between graduates and dropouts in employment. Certain reservations must be kept in mind, however, in regard to the facts presented. The "money value of education" theory may not be validly tested so short a time after leaving school. The depression, whether as a passing or recurring phenomenon, considerably distorts the employment situation.

3. Certain desirable characteristics and superior adjustments have been found to be associated with graduation. While there is no attempt made to imply causal relationships, the reliability of the differences between graduates and dropouts in favor of graduates in a considerable number of such characteristics is so very definite as to lend support to attempts at development of these characteristics and adjustments; this as much because their establishment may possibly lead to graduation as because the characteristics and adjustments are in themselves desirable and superior. The efforts of the school along these lines may be profitably directed toward aiding students in planning their careers, toward offering specialized assistance in such planning, toward emphasis upon the desirability of analysis of interests and of continuity of interests, career choices and post school activities.

4. The characteristics that are apparent during the student's school career are seemingly associated with desirable characteristics and adjustments which occur after the student has left school. It is the desire of the school that the student establish such characteristics and adjustments after leaving school, hence an additional incentive is provided to work toward the establishment of superior adjustments and characteristics while the students are still in school.

5. Students who make vocational plans while in school are superior to those who do not make such plans while in school in definite measurable respects.

6. The making of vocational plans while in school is closely associated with assistance received in vocational planning. This is shown by the fact that of the students who made vocational plans while in school, 45 per cent had received assistance while of the students who did not make such plans only 2.62 per cent reported that they had received assistance.

7. It is desirable for students to make vocational plans, and to have the associated adjustments and characteristics. Therefore the school should offer assistance in vocational planning to its students.

8. Students who have vocational plans in the period after high school are superior to those who do not have such plans in the following respects:

a. Agreement between subject of most interest and vocation preparing for in course taken after high school.
b. Agreement between subject of most interest and kind of work obtained.
c. Assistance received in vocational planning while in school.
d. The reliability of the difference between those who made vocational plans as against those who did not in their probability of graduation.

9. As far as the data in this research are concerned, the economic trends that are evident for youth as a whole are encouraging.

a. Nine of every ten youths found at least some employment after leaving high school.
b. The average duration of employment was 12.8 months. Students whose work histories contributed to this average left school in the period from June, 1934 to January, 1936. The data were gathered in the summer of 1937.
c. The average pay per week for all youth who secured employment was $14.40.
d. The employment of youth seems stable, the majority having held one job and 51 per cent of the group having held no more than two jobs.
e. Fifty-five per cent of youth worked only the standard eight hours or less per day.
f. Judging from the experience of youth concerned in the study the greatest opportunities would seem to be in the following fields listed in the order of their importance: stenography, typing, and bookkeeping, manual work, clerical and office work, sales work, shipping and stock.
g. Judging from the experiences of youth concerned in the study, the greatest opportunities would seem to be in the following industries listed in the order of their importance: manufacturing, and mechanical industries, trade, service occupations.

10. The educational trends for youth as a whole are not encouraging.

a. Approximately 14 per cent of students make no vocational plans while in high school.
b. More than 60 per cent of students receive no assistance in vocational planning while in school.
c. Approximately 24 per cent of students do not have vocational plans after leaving high school.
d. Approximately 60 per cent of students take no courses of any kind after leaving high school.
e. Approximately 50 per cent of students find something lacking in their preparation.
f. Approximately 70 per cent of students find no relationship between their present activities and their educational plans.
g. Approximately 55 per cent of students find no relationship between their present activities and their work plans.
h. Approximately 50 per cent of students find one or another obstacle to carrying out their various plans.
i. Seventy per cent of students have no agreement between vocational plans made while in school and kind of work obtained.
j. Fifty-seven per cent of students have no agreement between vocational plans made while in school and vocational plans made after leaving high school.
k. Thirty-six per cent of students have no agreement between kind of course taken after high school and kind of work obtained.
l. Forty-three per cent of students have no agreement between vocation preparing for in course taken after high school and kind of work obtained.
m. Forty per cent of students have no agreement between vocational plans made while in school and profession or vocation preparing for in course taken after high school.

TABLE I

DIFFERENCES BETWEEN GRADUATE AND DROPOUT GROUPS

	Graduate Group	Dropout Group
Academic Aptitude (Mean I. Q.'s)	105.6	96.3
Grade Averages (Per Cent Higher Than B—)	72.68	25.01
Vocational Planning While in School		
General Course Students	86.25%	91.36%
Commercial Course Students	65.77%	85.16%
Received Assistance in Voc. Planning	44.31%	32.06%
Agreement Between Original and Present Voc. Plans	45.89%	37.85%
Education After High School		
Day Business Schools	11.80%	4.52%
Trade Schools	2.01%	4.52%
Academic Courses (Academic Group)	36.48%	18.18%
Commercial Courses (Commercial Group)	69.54%	72.45%
Agreement Between Original Voc. Plans and Kind of Work Obtained	35.04%	19.72%
Agreement Between Original Voc. Plans and Voc. Preparing for in Course Taken After High School	60.63%	57.97%
Agreement Between Voc. Preparing for in Course Taken After High School and Kind of Work Obtained	57.14%	56.00%
Employment		
Number of Jobs Held		
One Job	60.02%	59.15%
Two Jobs	21.89%	21.58%
Methods of Obtaining Employment		
Own Efforts	17.33%	24.89%
Friends	36.25%	38.51%
Families	16.34%	21.66%
School	3.01%	1.37%
Employment Agencies	18.23%	6.76%
No Employment Since Leaving School	10.42%	8.54%
Average Number of Jobs Held	1.40	1.27
Duration of Employment	12.8ms.	12.8ms.
Average Weekly Pay	$14.69	$13.71
Present Educational Plans		
General Course Students	51.91%	36.83%
Commercial Course Students	35.14%	35.63%
Present Activities Contribute to Present Educational Plans	42.40%	19.67%
to Present Work Plans	55.13%	30.37%
Obstacles Found in Carrying Out Plans		
No Obstacles	52.07%	44.12%
Financial Obstacles	19.07%	21.03%
Insufficient Education	1.19%	6.58%
Leisure Time Activities		
Reading	27.09%	19.60%
Athletics	30.84%	34.59%
Social Activities	13.58%	10.53%
Hobbies and Domestic Arts	6.44%	10.04%

TABLE II

STUDENTS WITH PARTICULAR CHARACTERISTICS

	Number of Terms Spent in School		Changed Course		Reasons for Leaving School		Vocational Plans Made While in School		Received Assistance in Vocational Planning		Present Vocational Plans	
	4 Terms or Less	More than 4 terms	Yes	No	Economic	Others	Yes	No	Yes	No	Yes	No
Vocational Planning While in School		—	—						•			
Agreement Between Voc. Plans Made While in School and Kind of Work Obtained		—							—			
Agreement Bet. Voc. Plans Made While in School and Present Voc. Plans	o								•			
Assistance Received in Voc. Planning		•	o				•					
Agreement Bet. Subject of Most Interest and Voc. Preparing for in Course Taken After High School							—		+		+	
Agreement Bet. Subject of Most Interest and Kind of Work Obtained							•				—	
Agreement Bet. Subject of Most Interest and Most Valuable Subject for Work									•			
Present Vocational Planning		+			—				+			
Agreement Bet. Present Voc. Plans and Kind of Work Obtained		•			o				—			
Agreement Bet. Present Voc. Plans and Voc. Preparing for in Course Taken After High School	—				+					+		
Attendance at College or Special School		—			—				•		•	

LEGEND

The differentiations in the table are organized with respect to the reliability of differences as obtained through the C R_σ

•	Complete reliability	2.7
+	Fairly high reliability	1.3 to 2.7
—	Low reliability	.25 to 1.3
o	No reliability	.00 to .25

AUDITORY FACTORS IN FUNCTIONAL ARTICULATORY SPEECH DEFECTS*

MARGARET E. HALL

INTRODUCTION

BACKGROUND OF THE PROBLEM

The etiology of certain articulatory speech defects has long been a problem. It is well known that, even in the absence of organic or intellectual defect and in the presence of good speech patterns in the family, many children fail to develop adequate articulation, some carrying their defects even into adulthood. In search for the causation of these apparently functional defects speech pathologists have frequently been led to assume the possibility of a deficiency in auditory processes. Some have suggested a defect in acuity so slight that the child's general behavior was not affected noticeably, possibly even a defect limited to high sound frequencies only. Others have suggested the possibility of a defect in more complex auditory integrations which would affect perception of speech and, consequently, production of speech. It is often further assumed that the errors in speech sound discrimination bear some relation to errors in articulation and that both may be related to specific defects in acuity.

Because of the serious and well known consequences of deafness or marked hearing loss for speech development, especially when the defect exists from birth or from an early age, it has been natural to reason that cases showing articulatory defects which could not be explained on a structural, motor, or imitative basis were probably deficient in some aspect of audition. Up to the present time, however, there has been very little scientific investigation of this possibility and, consequently, little evidence either for or against this view. In advancing the possibilities of auditory deficiencies in the causation of articulatory defects the factor of general mental retardation has too often been ignored. Specific auditory disabilities must be distinguished from auditory disabilities which are merely a part and incidental manifestation of general retardation.

Several studies make a direct comparison between speech defectives and normal speakers on auditory tests, with somewhat conflicting results. Stinchfield[10] compared defective and good speakers on three of the Seashore measures of musical talent, the tests of pitch, intensity and tonal memory. The defective group had a median score of C— on the three tests and the good speakers a median score of C. These differences are slight and no measures of the significance of the difference are given.

Travis and Davis[11] using the same three Seashore tests, found a difference in favor of good speakers as compared to defective speakers in a university freshman class.

Travis and Rasmus[12] found functional speech defectives, again in a university freshman class, inferior to good speakers in their ability to discriminate speech sounds. Speech defectives at various grade levels in elementary school were also found inferior to good speakers on the same test of speech sound discrimination.

Barnes[1] found no relation between hearing loss as measured on the Western Electric 4-A Audiometer and articulation rating, or between speech sound discrimination and articulation rating in a university freshman class. This is in disagreement with the Travis and Rasmus study.

Saunders[9] attributes many speech defects, reading and spelling disabilities, comprehension difficulties and general difficulties in adjustment to short auditory memory span. She cites no experimental data, however, and bases her conclusions on case histories only.

Robbins[8] studied the auditory memory span of speech defectives as found on Stanford Binet examinations. Of pure sound substitution cases 28 per cent had short spans for their chronological ages, of stammerers, 21 per cent, of clutterers, 53 per cent, and of delayed speech cases, 60 per cent. Robbins concludes that many cases of functional

* The main content of a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Psychology, in the Graduate College of the State University of Iowa, February, 1938.

The writer wishes to express her indebtedness to Professor Lee Edward Travis for his suggestion of the problem and for his critical guidance throughout the investigation.

dyslalia, especially of cluttering, seem to be caused by short auditory memory spans. Robbins fails, however, to isolate auditory memory span from general intelligence, in which it is known to be a factor.

Ewing[2] tested ten children with "congenital aphasia" on the 2-A Audiometer and found in six cases a high frequency hearing loss which prevented most discrimination of speech sounds at the levels of intensity used in ordinary speaking. He considers this loss responsible for their failure to develop speech.

Howells and Schoolland[5] made a study of various interrelations among auditory abilities, but not in relation to speech defect. A test of speech perception involving ability to hear words in the presence of confusing and interfering noises showed the following correlations: with auditory acuity (Seashore Audiometer) .08 ± .064, with auditory acuity (watch tick) .06 ± .064, with Seashore intensity test .005 ± .078, consonance test .03 ± .071, rhythm test .06 ± .071, pitch test .09 ± .07, time test .12 ± .08, tonal memory test .21 ± .077 and intelligence .37 ± .069. The authors conclude that the ability to hear speech cannot be analyzed into elementary factors or acuity thresholds, and that the acuity factor in hearing has been over-estimated.

Statement of the Problem

The problem of this study was the comparison of functional articulatory speech defectives with a matched group of normal speakers in regard to auditory factors ranging from simple auditory acuity to perception of and memory for complex auditory patterns. A further problem was the investigation of a possible difference in importance of auditory factors at different ages, to which end comparisons were made for two age groups, university freshmen and elementary school children. The study, then, was designed to answer the following questions:

1. Are there any differences in auditory acuity between functional articulatory defectives and normal speakers?

2. Are there differences between defectives and normal speakers in the more complex auditory integrations demanded by discrimination between speech sounds, complex speech patterns and memory for speech sounds?

3. At what level in the ascending series of complexities are the greatest differences found?

4. If differences exist, at what age levels are they the greatest?

5. How, if at all, are specific auditory defects related to specific articulatory defects?

EXPERIMENT I. UNIVERSITY FRESHMEN

A. Subjects

Selection of Speech Defectives. Each freshman entering the State University of Iowa receives a series of speech examinations from trained examiners in the Speech Department.* At each of the first two examinations articulation is one of the factors considered and rated on a seven point scale, a rating of "1" indicating extreme inferiority and of "7" extreme superiority. Two such ratings are available on each case, together with similar ratings on voice and other factors in speech. As a preliminary group of defectives, all cases were selected whose articulation ratings for the two examinations totaled six or less, with the further condition that one rating be no higher than two. This use of a combined rating from two independent examinations with the additional condition that one of the ratings be very low insured a reliable selection of the most serious defectives in the freshman class. From the group thus isolated all cases were eliminated whose rating sheets showed notations of foreign accent, obvious organic defect or stuttering. The remaining cases, 83 in number, were kept as the experimental group. A total of 1029 were enrolled in the freshman speech course, 713 men and 316 women. Among the 83 functional speech defectives there were 20 women or 6.3 per cent of the total number of women in the course, and 63 men or 8.8 per cent of the total number of men. The 83 functional defectives represent 8.0 per cent of the total freshman course enrollment.

Matching of Experimental and Control Groups. Each articulatory speech defective selected as described above was paired with

* For a full description of the examination and classification of freshmen in speech at the State University of Iowa see the Ph.D. thesis of H. G. Barnes.[1] In this study on freshmen Barnes found a correlation coefficient of .75 between observers' ratings, considering articulation alone. The composite score in articulation of all observers at the first examination correlated .61 with the composite score of all observers at the second examination.

a freshman of the same sex and age who showed average or superior articulation. The criterion for the latter was a total rating of eight or more in articulation on the two examinations, with neither rating lower than four. This standard insured the selection of a group distinctly superior in articulation to the defective group. Intermediate cases were not included in either group. Because of the factor of general intelligence involved in some of the auditory perception tests, it was considered essential to control this factor by including it in the original pairing of cases. One of the most reliable measures of general ability possible to obtain, the Iowa Qualifying and Placement Examinations*, had already been given to all freshmen. The composite percentile rank on this battery was used.

The number of cases eligible for a control group was so large that a very exact pairing was possible. The good speakers were paired with the defectives on the basis of sex, age, and close correspondence in composite percentile rank. Table I indicates the success of the pairing in producing two groups almost identical in mean and dispersion of age and general ability, but with a marked difference in total articulation rating on the two examinations.

Small Experimental and Control Groups. The above 83 pairs of functional articulatory speech defectives and normal speakers were tested first on the three group auditory tests described in the next section. Preliminary analysis of results showed little, if any, difference between the experimental and control groups. It was therefore decided, before beginning the laborious and time-consuming task of giving individual 2-A Audiometer tests, to reduce the group to the 25 most serious defectives out of the 83 and their 25 normal-speaking pairs. It was felt that if any deficiency in acuity existed it should appear in the most serious defectives. The comparison shown in Table I between the small experimental and small control groups on matching criteria again indicates success in matching the defectives and normal speakers in regard to age and general ability, and their marked dissimilarity in articulation ratings.

* Published by the Bureau of Educational Research and Service, State University of Iowa, Iowa City, Iowa.

B. Experimental Tests

For both Experiments I and II the following general criteria were set up to govern the selection and construction of tests for the experimental batteries:

1. The tests must involve audition primarily. In the more complex tests of auditory perception it is inevitable that general intelligence will be involved to some degree, but every effort was made to keep the comprehension requirements of the tests simple enough to minimize the intelligence factor. A further control of this factor was achieved in the pairing of experimental and control groups at the outset on the basis of general ability.
2. The tests must not involve past experience or school achievement to any marked degree.
3. Each test must have a range of difficulty sufficiently great so that no subject will make either a zero or a perfect score.

TABLE I

COMPARISON OF LARGE AND SMALL EXPERIMENTAL AND CONTROL GROUPS ON MATCHING CRITERIA

Group	Number of cases			CA in years		Composite PR on Iowa Placement		Total articulation rating
	Men	Women	Total	Mean	S. D.	Mean	S. D.	Mean
Large Experimental	63	20	83	18.27	1.08	54.58	27.32	4.25
Large Control	63	20	83	18.29	1.11	54.25	27.39	8.36
Difference				.02		.33		4.12
CR*				.14		.08		27.80
Small Experimental	21	4	25	18.24	1.03	57.56	27.66	3.00
Small Control	21	4	25	18.28	1.00	56.48	28.71	8.32
Difference				.04		1.08		5.32
CR*				.14		.14		36.29

*Throughout the tables of this study "CR" refers to critical ratio, found by dividing the difference by the standard error of the difference.

4. The tests must not involve speech production in a way which would handicap speech defectives. The tests must involve speech on the sensory and perceptual side and not at all on the motor side. To further this end, all tests were devised so that responses were written or, in the case of the 2-A Audiometer, signalled. The only exception to this criterion was the test included for the express purpose of measuring articulation, Test 5, and this, of course, was not used as a measure of audition.

Experimental Battery

The following battery of tests was used, the entire group of 83 pairs receiving the second, third and fourth, and the small group of 25 pairs the first and fifth tests in addition. The purpose, construction, and content of each test are described below.

1. Western Electric 2-A Audiometer.
2. Travis–Rasmus Speech Sound Discrimination Test.
3. Complex Speech Sound Discrimination Test.
4. Speech Sound Memory Test.
5. Articulation Test.

1. *Western Electric 2-A Audiometer.* This test was selected because it is an accurate test of auditory acuity for pure tones over the pitch range most important for speech. It was felt that this test represents the simplest auditory process possible, namely, perception of a pure tone. The subject has only the task of deciding at any moment whether a tone is present or absent. No discrimination between tones or memory of tones is required.

Each subject took the audiometer test alone in a sound-proof room, the experimenter operating the audiometer in an adjacent room to avoid any possible noise. The subject pressed a signal button, which turned on a light in the experimenter's room, as soon as a sound came on and held it down as long as the sound lasted. The experimenter followed a uniform procedure of presenting the 1024 cps tone first until a threshold was established, then the 2048, 4096, and 8192 cps tones in order. The 1024 cps tone was presented again, the first one being used as a practice tone, then the 512, 256, 128 and 64 cps tones. Any tone which showed a hearing loss of more than ten decibels or any tone discrepant with the others was rechecked. In establishing the threshold, both ascensions and descensions were made, and the rhythm of presentation was varied. The duration of the tone was also varied and observation made of the length of the subject's light signal in relation to the tone. A certain degree of intensity was considered the threshold if a subject's signals coincided with the tone three times or more and if he consistently failed to hear the intensity five decibels softer. The same ear was tested first for both subjects of a pair.

2. *Travis–Rasmus Speech Sound Discrimination Test.* This is a standardized test[12] selected for the experimental battery because it represented an increase in auditory complexity over the audiometer, and yet represented a relatively simple auditory process, the comparison of two speech sounds. The subject has only to decide whether the two sounds are the same or different, and record S or D on his test blank. The test consists of 366 pairs of speech sounds, each of 24 consonants being paired once with every other consonant, each of 11 vowels with every other vowel, and each sound being paired once with itself. The pairs are arranged in chance order in columns of 22 pairs each. The score on the test is the number of errors. The authors of the test found a retest reliability of $.72 \pm .07$. The test requires about 20 minutes to give. A pause of one count was allowed between the sounds of a pair, of two counts between pairs. Ten counts were allowed between columns and a short rest half way through the test.

3. *Complex Speech Sound Discrimination Test.* This test was constructed for the present investigation to provide a measure of response to a complex auditory pattern. It was designed as a step-up in difficulty and complexity over the Travis–Rasmus test. In the latter, only two sounds are presented at a time, they involve only a simple comparison, they occur out of any meaningful context, and are, therefore, easily identifiable. In the present test an attempt was made to approximate as nearly as possible, the much greater complexity of the typical auditory pattern involved in hearing and learning a new word. An artificial or coined word was presented in a meaningful phrase. Coined words were used in order to eliminate the

unequal effects of differences in familiarity which would be present with real words. The subjects, however, were unaware that one word in each phrase was artificial. They were told that each phrase contained one very unusual word which they had probably not heard before.

A further purpose of this test was to investigate in auditory perception of speech the relative frequency with which various types of errors are made, as has been done frequently with the visual perception of words in reading. The following types of errors were studied: change in a vowel sound, change in a consonant sound, omission of a sound, addition of a sound and transposition of sounds. An item on the test was presented in the following manner: The experimenter read twice a phrase containing the "correct" word, giving the subjects sufficient opportunity to hear it well. Following that, the phrase was read six times, one time correctly and one time with the coined word containing each of the above five error types. The subjects were asked to listen to all six repetitions carefully, and decide which one was "correct", that is, like the two original presentations. One of six numbers following the item number was to be checked. To avoid the influence of any constant error due to position, the order in the series of the correct repetition and of each error type was rotated from item to item, each type occupying each of the six positions an equal number of times.

A typical item from the test is given to clarify the above explanation:

Item XVII. (Experimenter reads)
"my per'sa lent friend
my per'sa lent friend"

(Experimenter now reads the six repetitions)

1. **my per *la* sent friend (transposition of sounds)**
2. **my per —a *lent* friend (omission of a sound)**
3. **my p*oo*r sa lent friend (vowel change)**
4. **my per *f*a lent friend (consonant change)**
5. **my per sa lent friend (correct)**
6. **my per*b* sa lent friend" (addition of a sound)**

The subject then records his response on a test blank, the correct response on the above item being "5".

In constructing the artificial words, all the consonant and vowel sounds were used, both in the original words and in the "errors". Errors were made to occur in various positions within the words. Fifteen two-syllable, nine three-syllable, ten four-syllable, and four five-syllable words were devised, making 38 items in all. These were arranged from short to long in the order of difficulty. The score on the test was the number of errors made. The reliability of the test estimated by the Spearman–Brown prophecy formula from the odd-even reliability was .70 ± .01 on the 166 cases of the two groups together. This is sufficiently reliable for purposes of group comparison. The test requires about 20 minutes to give. A short rest period was allowed midway.

4. *Speech Sound Memory Test.* This test also was devised for the present investigation. Its specific purpose was to provide a measure of auditory memory for speech sounds. It requires the ability to discriminate between speech sounds in a series and then, upon a second repetition of the series, to detect a substitution for one of the sounds presented in the first repetition. A typical item on the test would be presented as follows:

(Experimenter reads a series of four consonant sounds, each sound followed by the neutral vowel "a" as in "*a*bove".
p sh n s (Experimenter pauses then reads)
p sh n *b*

The subjects then record after the item number the number of the sound substituted, in this case "4".

The test consisted of eight lists of ten items each, eighty items in all. The succeeding lists contained series of four consonant sounds, five consonant sounds, five vowel sounds, six consonant sounds, six vowel sounds, seven consonant sounds, seven vowel sounds, and eight consonant sounds, respectively. Vowels and consonants were not mixed in one series, but all were used an approximately equal number of times, both in the series proper and in the substitutions. The substitutions were made an equal number of times at each position in the series. Since the primary purpose of this test was to measure auditory memory rather than fine discrimination, similar sounds were not placed adjacent to each other in a series, and substitute sounds were always used which could be easily discriminated from the original sounds of the first repetition. The task in this test, then, was chiefly one of memory, in contrast to Test 3 where fine discrimination

was the chief requirement. The score was the number of errors. The reliability estimated from the odd-even reliability was .84 ± .01 for the total group. The test required about 25 minutes to give. The sounds were pronounced in an even, measured way at a rate slightly faster than one per second, and a pause of one to two seconds allowed before repeating the series. A brief rest was allowed at the end of each group of ten series.

5. *Articulation Test.* A series of forty sentences were constructed, each sentence emphasizing a particular speech sound. Twenty-five sentences presented consonant sounds in initial, medial, and final positions within words. Fifteen sentences presented vowels and diphthongs in both stressed and unstressed positions. The subject was asked to read the list of sentences aloud, no reference being made to articulation. The experimenter listened for only one sound at a time—the sound emphasized in the sentence being read—and recorded errors and inaccuracies on a prepared blank. A systematic check was thus obtained of a subject's articulation of each speech sound. All errors reported by speech instructors at the initial examinations were checked particularly.

C. Procedure

Conditions of Testing. It was announced in freshman speech classes that all freshmen were to be given a series of hearing tests at the psychological laboratory. This was further explained when they came for the experiments although they were not told that a comparison was to be made between good and poor speakers. The group tests were all given in a small quiet room. The maximum number tested at one time was 23 and usually the groups were much smaller. The subjects were seated in rows of chairs with writing arms. Both experimental and control cases were always present at the same time in a group so that any variations in the experimenter's clearness of articulation from time to time would have no more effect on the experimental group than on the control group. All tests were given by the experimenter only. Since fine discriminations of speech sounds were being tested, it was thought that speech production should be as constant as possible for all subjects.

Detailed Procedure. For the three group tests, the Travis–Rasmus, Complex Speech Sound Discrimination and Speech Sound Memory, the procedure was the same. Instructions were given with the experimenter standing in front of the group so that visual speech clues could aid in the understanding of the task and in making the discriminations on the practice items. After the test proper began, the experimenter stood behind the group so that discriminations had to be made on an auditory basis only. For all three tests the experimenter maintained as nearly as possible a uniform pitch and intensity of voice, and spaced the parts of an item evenly so that there would be no emphasis, inflection or grouping to aid in making correct responses. It was desired to reduce the discriminations involved to differences in speech sound quality alone.

The 25 cases of the small control group and 25 cases of the small experimental group, in addition to the above tests, were given, on another day, individual 2-A Audiometer tests and Articulation tests.

Summary of Procedure. The tests of the experimental battery were given on three different days as follows:

First day: Travis–Rasmus Speech Sound Discrimination Test.
Complex Speech Sound Discrimination Test.
Second day: Speech Sound Memory Test.
Third day: 2-A Audiometer Test.
Articulation Test.

D. Results

I. *The Large Experimental and Control Groups of 83 Pairs*

General Comparisons on the Three Group Tests. Means and standard deviations of the experimental and control groups on the three group tests of auditory perception of speech are presented in Table II. Inspection of this table reveals that in no case is there a significant difference between the means of the two groups.

Barnes, studying freshmen in preceding years[1], found no significant difference between the speech defective group and superior speakers on the Travis–Rasmus test. The mean number of errors he found for the defectives in 1930 was 7.7, and for another group in 1931, 5.5. The mean for superior speakers and also the mean for the class as a whole was 6.3 errors. These means are

TABLE II

COMPARISON BETWEEN FRESHMAN EXPERIMENTAL AND CONTROL GROUPS ON TESTS OF THE EXPERIMENTAL BATTERY

(N = 83 experimental and 83 control cases)

Group	Travis–Rasmus Mean Errors	S.D.	Complex Speech Sound Discrim. Mean Errors	S.D.	Speech Sound Memory Mean Errors	S.D.
Experimental	9.48	6.19	5.58	3.44	28.63	8.04
Control	8.40	4.45	6.10	3.55	30.90	9.63
Difference	1.08		0.52		2.27	
S.E. Diff.	0.85		0.56		1.41	
CR	1.26		0.94		1.60	

slightly smaller than the means for both groups of the present study. This difference is probably accounted for by Barnes' elimination in computing his averages of 20 cases having more than 37 errors.

Both Barnes' study and the present study disagree with the results found by Travis and Rasmus when their test was standardized.[12] They found a mean of 14.0 errors for 62 university student speech defectives and a standard deviation of 15.5. For 223 normal speakers the mean was 3.8 and standard deviation 2.6. Their results show a difference between speech defectives and normal speakers not found by either Barnes or the writer. The discrepancy may possibly be accounted for by differences between the studies in the selection of speech defectives, or by the natural variation among examiners in their articulation and voice quality in presenting the sound pairs of the test. A third possibility lies in the fact that Barnes and the writer tested both defectives and normals in the same groups. In the Travis–Rasmus study normals were tested in groups and defectives individually for the most part.

Table III shows the intercorrelations for the experimental group between the composite percentile rank on the Iowa Qualifying Examinations, total articulation rating and the three group tests, and the same intercorrelations for the control group. Judged by the usual criterion of significance, a coefficient equal to or greater than four times its probable error[4](p. 281), only one coefficient in the experimental group is significant, that between the Complex Speech Sound Discrimination Test and Composite Percentile Rank. The correlation between the Complex Speech Sound Discrimination and the Speech Sound Memory Tests approaches significance. For the control group the same two correlations are significant. In addition, the correlations of the Travis–Rasmus Test with the Complex

TABLE III

INTERCORRELATIONS BETWEEN TESTS OF THE EXPERIMENTAL BATTERY, FRESHMAN EXPERIMENTAL AND CONTROL GROUPS

Test	Composite PR on Qualifying Examinations		Total articulation rating		Errors on Travis-Rasmus Test		Errors on Complex Disc. Test	
Freshman experimental group (N=81)								
Errors on Speech Sound Memory	—.16	±.07	—.01	±.07	.12	±.07	.27	±.07
Errors on Complex Sound Disc.	—.43	±.06	.09	±.07	.20	±.07		
Errors on Travis-Rasmus	—.22	±.07	—.08	±.07				
Total articulation rating	—.13	±.07						
Freshman control group (N=77)								
Errors on Speech Sound Memory	—.33	±.07	—.08	±.08	.38	±.07	.43	±.06
Errors on Complex Sound Disc.	—.43	±.07	—.17	±.08	.47	±.06		
Errors on Travis-Rasmus	—.15	±.08	—.11	±.08				
Total articulation Rating	.19	±.07						

Speech Sound Discrimination and with the Speech Sound Memory Tests are significant, and the correlation between Composite Percentile Rank and the Speech Sound Memory Test.

The chief importance of the findings in Table III is the absence of relationship between total articulation rating and the three measures of auditory discrimination. Barnes[1], too, found a lack of correlation, —.03, between articulation ratings and the Travis–Rasmus Test. Another important finding is the absence of relationship between articulation rating and Composite Percentile Rank. Barnes, again, found a low correlation, .14, between these two measures. There is some evidence that both the Complex Speech Sound Discrimination and the Speech Sound Memory tests contain a general intelligence factor as evidenced by the significant correlations for the control group between them and the Composite Percentile Rank on the Iowa Qualifying Examinations.

Errors in Articulation. The following tabulations of articulation errors are based upon the errors noted by instructors in the Speech Department freshmen examinations referred to earlier. Articulation errors are tabulated in Table IV in order of their frequency in the experimental group. Some control group cases had a few articulation errors but these were very slight as evidenced by their total articulation ratings of eight or more. The relative frequency with which the different sounds were missed is similar for both groups. The first ten most frequently missed sounds in Barnes' study were, in order of occurrence: s, z, ʍ, ʃ, θ, tʃ, l, m, n and r, for the 75 cases of his most defective or "clinic" group.[1] The order of difficulty can be seen to be very much alike in both studies, and, in both, consonants far exceed vowels in frequency of error. The sounds most often missed in articulation tend to be high frequency sounds in their physical characteristics.

More general articulatory defects are presented in Table V and the groups are also compared on voice ratings and voice defects, although voice was not considered in the original matchings of groups. Tabulation was made of all defects noted at either one or both of the examinations.

Most of the cases showing "oral inactivity" or "oral inaccuracy" are also tabulated in Table IV because specific sounds were incorrectly articulated.

There is a striking contrast between the two groups in the number of defective and

TABLE IV

ERRORS IN ARTICULATION AS NOTED IN SPEECH DEPARTMENT EXAMINATION

[N = 83 Experimental and 83 Control Cases]

Defective sound	Experimental group		Control group	
	Rank*	Percent missing sound	Rank*	Percent missing sound
s	1.	83.1	1.	20.5
z	2.	75.9	2.	16.9
ʤ	3.	48.2	5.5	3.6
ʃ	4.	37.3	5.5	3.6
tʃ	5.	34.9	9.	2.4
ʍ	6.	28.9	3.	10.8
ʒ	7.5	10.8	4.	4.8
ð	7.5	10.8		
ŋ	9.	9.6	9.	2.4
θ	10.5	7.2	9.	2.4
ɑ	10.5	7.2	14.5	1.2
m	12.5	6.0	14.5	1.2
n	12.5	6.0		
t	14.5	4.8	9.	2.4
ju	14.5	4.8	14.5	1.2
aɪ	17.	2.4	9.	2.4
l	17.	2.4	14.5	1.2
aU	17.	2.4	14.5	1.2

The following sounds were missed by one case each in the experimental group: v, o, r, d. No other sounds were reported as defective for either group.

* Sounds missed an equal number of times were given a median range. For example 3 and 5 would occupy ranks 7 and 8 and are therefore given the median rank of 7.5[1[p. 120]].

TABLE V

COMPARISON OF THE FRESHMAN EXPERIMENTAL AND CONTROL GROUPS IN ARTICULATORY AND VOICE DEFECTS

[N = 83 Experimental and 83 Control Cases]

	Experimental		Control	
Articulatory Defects	No.	Percent	No.	Percent
Oral inactivity	47	56.6	12	14.5
Oral inaccuracy	30	36.1	7	8.4
Too rapid speech	12	14.5	4	4.8
Poor rhythm	23	27.7	7	8.4
Careless articulation	8	9.6	12	14.5
Voice Defects				
Defect in:				
Quality	66	79.5	48	57.8
Flexibility	57	68.7	30	36.1
Intensity	18	21.7	9	10.8
Pitch	12	14.5	6	7.2
Duration	9	10.8	4	4.8
Total of two voice ratings:				
5 or less	32	38.6	2	2.4
8 or more	16	19.3	63	75.9

superior voices. The articulatory group greatly exceeds the control group in the percentage of cases with poor voices. The control group exceeds in the percentage of cases with superior voices. Each specific type of voice defect is more frequent in the experimental group.

Analysis of Errors on the Travis–Rasmus Speech Sound Discrimination Test. Table VI shows the sound pairs ranked in order of difficulty for the control group. The rank order of difficulty for the experimental group is also given and the rank order of difficulty found by Rasmus[7] on 223 normal adults. In Table VI only the 15 pairs most frequently missed by the control group are given, although ranks and percents were calculated for all sounds missed. The sound pairs tend to show somewhat the same relative difficulty for all groups, particularly for the two groups of the present study. Three sound pairs are among the six most difficult pairs for all

TABLE VI

COMPARISON OF FRESHMAN EXPERIMENTAL AND CONTROL GROUPS ON ERRORS ON THE TRAVIS–RASMUS TEST

[N = 82 Experimental and 82 Control Cases]

	Control group		Experimental group		Rasmus' results	
Sound Pair	Rank*	Percent missing	Rank*	Percent missing	Rank*	Percent missing
dʒa–ʒa	1.	70.	1.	71.	21.	4
θa–fa	2.	60	2.	60	1.	61
ba–va	3.	57	3.	57	7.	10
ha–pa	4.	44	6.	33	7.	10
wa–ʍa	5.5	38	4.	46	3.	19
ða–va	5.5	38	5.	34	2.	57
ba–fa	7.	32	10.	20	21.	4
ə–ʌ	8.	30	7.	28	35.	2
ʃa–ʒa	9.5	22	19.5	11	7.	10
θa–ða	9.5	22	9.	22	11.	8
fa–va	11.	18	11.	17	11.	8
sa–za	13.	15	15.5	12	14.5	6
θa–va	13.	15	15.5	12	21.	4
a–ɑ	13.	15	8.	26	21.	4
ʍa–ʍa	15.	13	36.5	6	21.	4

*See note to Table IV for method of ranking.

groups: θa–fa, ða–va, ωa–ɯa. Of the total number of 366 pairs in the test, 190 pairs were missed by one or more cases of either or both freshman groups, 176 were not missed at all. All of the 35 pairs of "same" sounds were missed at least once. One hundred fifty-five, or 46.8 per cent, of the 331 pairs of different sounds were missed. Vowels and consonants were missed in about the same proportion that they occur in the test.

Analysis of Error Types on the Complex Speech Sound Discrimination Test. The five types of errors do not occur with equal frequency although, by chance alone, they would be expected to. There are no significant differences between the experimental and control groups in incidence of any type of error or of correct responses, and both groups show exactly the same order of difficulty for the five error types. The order from most to least frequent is: addition of sound, omission of sound, consonant change, vowel change and transposition of sounds. It is evidently most difficult to detect the addition of a sound to the original "word", and least difficult to detect a transposition of sounds. Omissions and additions do not involve a change in sound quality, whereas both consonant and vowel changes do. Analysis of individual cases revealed no instances of excessive errors of any error type out of keeping with the observed proportions for the group as a whole. The results of this test may indicate the possible value of considering error types in sound discrimination in the diagnosis of a functional articulatory case. Remedial drills such as those suggested by Monroe and Backus[6] for omission, addition, etc. errors in reading, might be presented auditorially should a case show in auditory discrimination of words excessive errors in any error type.

Analysis of Errors on the Speech Sound Memory Test. The mean number of errors was found for each series of ten items, each series, as described earlier, containing items composed of the same number of sounds and composed of either consonant or vowels but not both. There were no significant differences between the experimental and control groups in mean number of errors for any series. For both groups consonant series consistently showed a larger mean number of errors than vowel series of the same length. The subjects also reported the vowel series as being much easier to hear and remember than the consonant series. It will be remembered, too, that in the Complex Speech Sound Discrimination Test vowel errors were made next to the least frequently of the five types. A possible explanation for this is that vowels, as shown by Fletcher[3](p. 74), all contain more speech power than any consonant sound.

II. *The Small Experimental and Control Groups of 25 Pairs*

The small groups of the most serious defectives and their pairs show means and S.D.'s very similar to those of the large groups on the three group tests of auditory discrimination. No greater differences between experimental and control groups are found even when the 25 most defective speakers are selected for comparison.

Errors in Articulation. Articulation errors made during the reading of the Articulation Test sentences were tabulated for both groups and presented in Table VII. Errors, even if present, were very slight in the control group cases. The sounds show an almost identical rank order of difficulty in these small groups as in the large groups discussed above. The most serious articulatory de-

TABLE VII

ERRORS ON ARTICULATION TEST OF SMALL FRESHMAN EXPERIMENTAL AND CONTROL GROUPS

[N = 25 experimental and 25 control cases]

Sound	Number out of 25 having this error	
	Experimental	Control
s	24	6
z	23	3
ʃ	15	
ɯ	12	3
tʃ	11	1
dʒ	11	
ʒ	8	1
θ	8	
ð	6	
ɑ	4	1
ŋ	3	1
ju	3	
i	3	
m	2	1
n	2	

Several other sounds were missed once each by a member of either the experimental or the control group

fectives miss, not different sounds, but more sounds, and to a more marked degree.

Relation Between Articulation Errors and Errors in Speech Sound Discrimination on the Travis–Rasmus Test. The order of difficulty of the various sound pairs is very similar for both small and large experimental and control groups. The eight most frequent errors for the large experimental group are also the eight most frequent errors for the two small groups. These sound pairs are: dʒa–ʒa, θa–fa, ba–va, ωa–w, ðа–va, ha–pa, ba–fa, and a–ʌ.

Contrary to the findings of Travis and Rasmus[12] little relation was found between most frequent articulation errors and most frequent discrimination errors. The sounds s and z at the top of the articulation list (Table VII) occur only four times as one of a sound pair in the 48 sound discrimination pairs most frequently missed by the experimental group, and, even at that, occur far from the top of the list. The sound ʃ, the articulatory error third in frequency and tʃ, the fifth, are seldom missed in the discrimination test. Articulation errors dʒ, ʒ, θ, ð, and ʍ are somewhat more frequently missed in the discrimination test, the sound pair dʒa–ʒa heading the list of discrimination test errors.

An analysis of articulation and discrimination errors in individual cases also reveals little relationship. Sounds with which a case is having articulatory difficulty are missed with about chance frequency in the discrimination test. The writer's conclusion from these results is that administration of the Travis–Rasmus test to all speech defectives, or of the whole test to any defective, would hardly be profitable. A brief, informal method would be to test his discrimination on a few sound pairs involving only sounds giving articulatory difficulty. In the writer's opinion little relation would be found even then, but the procedure would rule out even the remote possibility of discrimination as a contributing factor in his articulatory defect.

Results of the 2-A Audiometer Tests. The results of the administration of the 2-A Audiometer tests to the 25 most serious freshmen defectives and their pairs are given in Table VIII, for right and left ears separately. Both groups are shown to have an approximately normal threshold curve if allowance is made, as suggested in the note to the table, for correction at two frequencies. Examination of the table reveals that,

TABLE VIII

COMPARISON BETWEEN FRESHMAN EXPERIMENTAL AND CONTROL GROUPS ON THE 2-A AUDIOMETER*

[N = 25 Experimental and 25 Control Cases]

		Right Ear: Decibels above the normal threshold Frequencies in cycles per second							
Group		64	128	256	512	1024	2048	4096	8192
Experimental	Mean	.80	1.00	—1.80	3.40	2.60	.20	—7.60	— .60
	S. D.	5.04	4.69	4.87	4.49	6.80	5.38	6.65	12.91
Control	Mean	3.60	3.60	.80	6.00	6.60	2.40	—6.40	— .40
	S. D.	7.28	8.66	6.74	6.78	6.59	7.23	13.89	14.28
Difference in Means		2.80	2.60	2.60	2.60	4.00	2.20	1.20	.20
S. E. Diff.		1.77	1.97	1.66	1.63	1.89	1.80	3.08	3.85
CR		1.58	1.32	1.56	1.60	2.11	1.22	.39	.05
Group		Left Ear: Decibels above the normal threshold							
Experimental	Mean	3.20	1.60	.40	3.80	1.60	.80	—10.8	.20
	S. D.	5.64	6.12	5.99	6.82	7.84	4.83	12.94	14.80
Control	Mean	6.40	6.80	3.80	7.60	6.00	.00	—8.8	2.20
	S. D.	5.20	5.64	5.88	5.31	5.66	7.35	17.51	13.20
Difference in Means		3.20	5.20	3.40	3.80	4.40	— .80	2.00	2.00
S. E. Diff.		1.53	1.66	1.68	1.73	1.93	1.76	4.35	3.97
CR		2.09	3.13	2.03	2.20	2.28	.45	.46	.50

*The results of testing many normal ears on the audiometer used in this study indicated that the intensity at 4096 cps was between 5 and 10 decibels lower than that indicated on the calibrated intensity scale, and that at 256 cps the intensity was between 0 and 5 decibels too low also. The data, however, are presented exactly as found, without correction, since all cases would be affected equally. Corrections can be made by the reader if desired.

although only one difference in means between the control and experimental groups is statistically significant, all of the sixteen differences but one are in favor of the control group. These differences are so slight, however, that, even were they statistically significant, it is doubtful whether they would be psychologically significant. There is little information available in the literature on the relation between auditory acuity and articulation except for very hard-of-hearing or deaf cases, but it is unlikely that a hearing loss would affect hearing for speech and, therefore, articulation, unless it exceeded ten or fifteen decibels at least for the range of frequencies most important for speech. Fletcher[3](p. 67) gives the average speech power of conversational speech as ten microwatts, which is about 60 decibels above the normal threshold, and also states that the noise level in an average city room raises the threshold approximately 30 decibels. This means that small hearing losses would not be a handicap under most conditions in which speech is heard, since the masking effect of room noise is usually greater anyway than the amount of such slight hearing losses.

There is a tendency for the S.D.'s of both groups to increase in size at the upper frequencies. This is in harmony with the experience of those familiar with the 2-A Audiometer that it is more difficult to establish a threshold at the two highest frequencies. Cases fluctuate more from trial to trial and there is more variability from case to case at these frequencies than at those lower. Subjects frequently report that they are less sure of whether a sound is present or not at the high pitches. Some report that the high pitches tend to become confused with head noises. The phenomenon of standing waves may also account for the fluctuations from moment to moment of the threshold for the 8192 cps tone as the head phone is readjusted by the subject, and may account for the large fluctuations from subject to subject, depending upon the tightness with which the earphone is applied to the ear.

The three frequencies on the 2-A Audiometer in the range most important for speech and the three from which "percent hearing loss" is calculated are 512, 1024, and 2048 cps. Means based upon only these tones were compared for the two groups and, again, showed a slight, but statistically insignificant difference, in favor of the control group. Means based upon the best ear of each person for the middle frequencies also showed a slight but insignificant difference between groups. These data are shown in Table IX. Comparisons were made between experimental and control groups on means of the lower four frequencies, 64, 128, 256, and 512 cps, and means of the upper four frequencies; 1024, 2048, 4096 and 8192 cps. These are given in the same table and also fail to show a significant difference. The hypothesis of high frequency hearing loss, often advanced to account for functional articulatory defects, is evidently untenable as a generalized explanation, although it might be true in isolated cases.

In Table X are shown the intercorrelations between 2-A Audiometer results and Composite Percentile Rank on the Iowa Qualifying Examinations, articulation rating and number of errors on each of the auditory

TABLE IX

COMPARISON BETWEEN FRESHMAN EXPERIMENTAL AND CONTROL GROUPS ON VARIOUS COMPOSITE AUDIOMETER MEASURES

[N = 25 Experimental and 25 Control Cases]

	Mean No. of DB's above normal for all 8 frequencies combined			Mean No. of DB's above normal for the 3 middle frequencies (512, 1024, 2048)				Mean No. of DB's above normal for both ears	
Group	Left Ear	Right Ear	Both Ears	Left Ear	Right Ear	Both Ears	Best Ear	Ave. of lower 4 freq.	Ave. of upper 4 freq.
Experimental Mean	.10	— .25	— .08	2.08	2.06	2.06	3.93	1.56	—1.70
S. D.	6.03	3.33	4.26	5.60	4.31	4.50	4.79	4.23	5.81
Control Mean	3.02	2.02	2.50	4.53	5.00	4.76	6.61	4.84	.20
S. D.	5.34	6.62	5.42	4.68	6.02	4.89	4.56	5.40	7.34
Difference in Means	2.92	2.27	2.58	2.45	2.94	2.70	2.68	2.28	1.90
S. E. Diff.	1.61	1.48	1.38	1.46	1.48	1.33	1.32	1.37	1.87
CR	1.81	1.53	1.87	1.68	1.99	2.03	2.03	1.66	1.02

TABLE X

CORRELATION BETWEEN 2-A AUDIOMETER (AVERAGE THRESHOLD) OF THE BEST EAR FOR THE FREQUENCIES 512, 1024, AND 2048) AND THE OTHER TESTS OF THE EXPERIMENTAL BATTERY

(N = 25 experimental and 25 control cases)

Group	Composite PR on Iowa Qualifying exam.	Total articulation rating	Travis Rasmus errors	Complex Sound disc. errors	Speech Sound Memory errors
Experimental					
r	—.02	—.25	.10	.06	—.36
PEr	.13	.13	.14	.13	.12
Control					
r	—.14	—.21	—.18	—.04	—.22
PEr	.13	.13	.13	.13	.13

discrimination tests. The audiometer measure used in the intercorrelations was the average of the three middle frequencies for the best ear since this seemed to provide the best single measure of effective hearing for speech. No coefficient exceeds a value four times its probable error, so no significant relationships are demonstrated for either group. None of the three group tests for discrimination of speech sounds shows a significant correlation with the audiometer results, although as shown above in Table III, the three tests correlate significantly with each other. Articulation ratings also fail to show a significant correlation with the audiometer results.

Nineteen cases from both experimental and control groups who had a mean hearing loss on the upper four frequencies of three decibels or more were compared on the three group tests of auditory discrimination with sixteen cases who had a mean three decibels or more above average. The means showed no difference of any significance between the high and low acuity groups.

E. CONCLUSIONS

1. No significant differences were found between functional speech defectives and normal speakers in ability to discriminate between pairs of speech sounds or to discriminate and recognize upon further repetition the sounds in a complex auditory pattern, or to remember sequences of speech sounds and detect a substitution upon repetition.

2. On the 2-A Audiometer, differences at every frequency were in favor of the control group but none was statistically significant. All composite audiometer measures—average of middle frequencies, average of lower four, average of upper four, and average of all eight—also showed differences in favor of the control group but none of statistical significance.

3. For both groups S.D.'s were greater at the two highest frequencies than at lower frequencies.

4. For both groups the 2-A Audiometer threshold curve was normal.

5. The 2-A Audiometer results failed to correlate significantly with any other measure.

6. Articulation rating showed zero correlations with all four auditory measures and with composite percentile rank on the Iowa Qualifying Examinations.

7. There was positive but not high correlation among the three tests of auditory perception of speech, the control group showing slightly higher correlations than the experimental group.

8. The Composite Percentile Rank showed a low positive correlation with the Complex Speech Sound Discrimination and the Speech Sound Memory tests, and no significant correlation with articulation rating or the Travis–Rasmus test.

9. The rank order of frequency of articulatory error for the different sounds was very similar for the large group of 83 defectives as for the small group of 25 most serious defectives, and also similar to Barnes' results.[1] The most serious defectives missed, not different sounds, but more sounds and to a more marked degree. The seven most frequent articulatory errors for both large and small groups were: s, z, ʤ, ʃ, tʃ, ʍ and ɜ. Five of these were also among Barnes' first ten.

10. The experimental group showed a larger percentage of low ratings on voice than did the control group, and about twice as many cases of each type of voice defect.

11. The two groups showed highly similar results on sound pairs missed most frequently in discrimination. The results were very similar to those found by Rasmus[7] in the standardization of the test. Three sound pairs are among the most difficult pairs for all groups: θa–fa, ða–va and ωa–ɯa.

12. Analysis, case by case, showed no relation between errors in discrimination and errors in articulation.

13. When equal opportunity was given for any one of five error types to be made in sound discrimination, the order from most to least frequent was: addition of sounds, omission of sounds, consonant change, vowel change and transposition of sounds. These results were the same for both groups.

14. On the Speech Sound Memory Test, consonant series of any length were found to be harder than vowel series of the same length. This was true for both groups.

15. A group high in acuity on the upper four 2-A Audiometer frequencies showed no significant difference in means on the three group tests of auditory perception of speech from a low acuity group.

EXPERIMENT II. ELEMENTARY SCHOOL CHILDREN

A. Subjects

Selection of Subjects. This experiment was conducted in a public elementary school in Iowa City drawing children from homes of predominantly average socio-economic status, and including kindergarten and the first six grades. No speech ratings were available in advance as in Experiment I. To select the speech defectives, therefore, the experimenter prepared a blank to be filled out by each classroom teacher. On the blank each child's name was to be listed under one of three headings, average or good speakers, speech defectives of any type, and cases about which the teacher was uncertain. A preliminary meeting was held with the teachers to explain the project, to discuss the possible speech defects which might be found in their classes, and to give detailed instructions for filling out the blanks. Only grades two and above were included in the study, all the techniques not being suitable for younger children.

The experimenter and an experienced speech pathologist examined each of the 35 children listed as speech defectives by the teachers, to rule out organic cases. Seven such cases and seven cases with speech defects other than articulatory were dropped. Each of the remaining 21 children was examined individually by the experimenter on the Detroit Articulation Tests.* The sentence list from this test was used with children who could read easily, and the picture book with the younger children. One sound was observed at a time and all errors in articulation recorded in detail.

Three of the 21 children were dropped from the group because their defects were so slight as to be scarcely noticeable. During the course of examining control group children, three speech defectives were found who had not been reported by teachers. These were added to the experimental group, making 21 cases in all, or 6.1 per cent of the total 342 children in grades two through six. There were sixteen boys, or 8.4 per cent of the total number of 190 boys in these grades, and five girls, or 3.3 per cent of the total number of 152 girls. This preponderance of boys over girls is in accordance with the usual finding that boys exceed girls in all types of language disability.

Matching of Experimental and Control Groups. The children listed by the teachers as good speakers were given the same individual speech examination given the defectives and a few cases with very mild defects dropped. Each speech defective was then paired with from two to five control group children on the basis of sex, chronological age, and intelligence quotient. In chronological age most control cases were within four months of their defective pairs, a few deviating more widely, but all within 12 months. For both groups the total age range was from 7 years, 2 months to 13 years, 5 months. Group intelligence tests had already been given in the school so these results were used.* IQ's were matched within a few points in most cases, a few showing greater deviations. These deviations, however, were rather well balanced for those control cases matched with any one experimental case. For the experimental group the total IQ range was 79 to 129, for the

* Published by the Board of Education, City of Detroit, 1933, Detroit, Michigan.

* The tests given in the school were: Otis Quick Scoring Mental Ability, published by the World Book Co., 1936, the Otis Group Primary, published by the World Book Co., 1929, and the Kuhlmann–Anderson, published by the Educational Test Bureau, Inc. Minneapolis, Minn., Fourth Edition, 1933.

TABLE XI

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON MATCHING CRITERIA

Group	No. of cases Boys	Girls	Total	Chronological age in months Mean	S.D.	Intelligence Quotient Mean	S.D.
Experimental	16	5	21	113.90	19.14	104.90	12.84
Control	45	19	64	114.89	18.55	104.48	10.81
Difference				.99		.42	
S.E. Difference				4.78		3.13	
CR				.21		.14	

control group 82 to 120. The final control group numbered 64. A comparison of the two groups in the matching criteria, as shown in Table XI indicates close correspondence in means and S.D.'s.

B. EXPERIMENTAL TESTS

In general, the same tests were used with the elementary school children as with the freshmen, with only the minor variations in administration and content described below. The following battery of tests was given to both experimental and control groups:

1. Western Electric 2-A Audiometer Test.
2. Travis–Rasmus Speech Sound Discrimination Test.
3. Complex Speech Sound Discrimination Test.
4. Speech Sound Memory Test.
5. Detroit Articulation Tests.

1. *Western Electric 2-A Audiometer.* This test was given in exactly the same manner as with the freshmen except that much more explanation was required with the children. They were brought to the same sound-proof room in the Psychological laboratory used in Experiment I. The right ear of a child was tested first in every case. The child was then allowed to rest and play while another child was tested, and later brought back to have his left ear tested. The test was presented with careful explanation and in such a way as to challenge the child to do his best. The experimenter felt that very satisfactory results could be obtained even with children as young as six and seven years if sufficient explanation and motivation were given. In a few cases where children had difficulty understanding what to do the experimenter moved the audiometer into the sound-proof room so that the child's reactions could be observed directly and a constant check made on his attentiveness. The experimenter did more re-checking of tones than was necessary with the freshmen.

2. *Travis–Rasmus Speech Sound Discrimination Test.* The same test described in Experiment I was used with the children, except that more practice was allowed before starting and more rest periods given. Only half the test was given at one sitting, the other half at another. The score was the number of items wrong.

3. *Complex Speech Sound Discrimination Test.* This test using artificial words had to be revised radically to be used with children, although the same principles were involved as in the freshman form of the test. In the simpler form for children the length of each item was shortened. One repetition was given of the "correct" phrase, then, after a pause, two repetitions, one of which was "correct" and one of which contained an error in the artificial word. The child encircled "1" or "2" after the item number for the one he thought correct. There were ten such items, followed by thirty items in which three trial repetitions were given following the original "correct" one. For these, the child encircled "1", "2", or "3" after the item number. All five error types were used an equal number of times, and occurred with equal frequency at each position in the series. The artificial words were from one to three syllables in length. A typical item from the test as presented follows:

Item 25. (Experimenter reads) "A ves tik radio"
(Experimenter pauses, then reads)
"1. A ve__ tik radio (omission of a sound)
2. A *hes* tik radio (consonant change)
3. A ves tik radio" (correct)

The subject, to respond correctly, must encircle "3".

There were 40 items in all and the test required about 30 minutes to give. The score was the number of items wrong. The estimated reliability from the odd-even reliability

was found to be .71 ± .04 on the 85 cases of the experimental and control groups together.

4. *Speech Sound Memory Test.* The identical series used in the freshman form of this test were incorporated into the simple form for children. Some of the longer series were omitted at the end of the test and shorter series were added at the beginning. The test consisted of eight lists of ten items each, the first list containing series of two consonant sounds, the next of three consonants, the next of three vowels, the next of four consonants, the next of four vowels, the next of five consonants, the next of five vowels and the last of six consonants. There were 80 items altogether. The lists containing series of five and of six consonants were found to be too difficult for many children and were finally omitted from the scoring, leaving 60 items. The score was the number of errors. The reliability estimated from the odd-even reliability was .94 ± .01 on the 85 cases.

5. *Detroit Articulation Tests.* For the young children who do not read, there is a book of pictures which the child names. For older children there is a card on which there are sentences to be read, each sentence emphasizing a particular sound to which the examiner listens.

Additional data. In addition to the intelligence test results, mentioned above, results of achievement tests in silent reading already given in the school were obtained from the school records.* These were used to compare the experimental and control groups on a language-related ability other than articulation.

C. Procedure

Conditions of Testing. The school building was crowded, with little space available for testing, so the conditions were not so satisfactory as could have been desired. A few sessions were held in the gymnasium where there was considerable reverberation, but most of the group tests were given in one of two much smaller and quieter rooms. All conditions, however, were equal for experimental and control groups, since children from both groups were always present in any group being tested. No more than eighteen were tested at one time, usually fewer, so close supervision could be given. The 2-A Audiometer tests were given in the soundproof room at the Psychological Laboratory of the State University of Iowa.

Presentation of Tests. In giving the three group tests the experimenter always stood in front of the children while explaining a test and giving practice items, so that visual clues such as lip-reading could aid them in understanding what to do. In presenting the actual test items the experimenter stood behind the children so that they would have to depend upon auditory perception alone. As with the freshmen, the experimenter was careful to keep pitch, intensity, emphasis, inflection and spacing of items uniform so that discriminations would be on the basis of speech sound quality alone.

Summary of Procedure. Each child took the tests in six sittings and in the following order:

First day. Detroit Articulation Test.
Second day. First half of Travis–Rasmus Test.
Third day. Second half of Travis–Rasmus Test.
Fourth day. Speech Sound Memory Test.
Fifth day. Complex Speech Sound Discrimination Test.
Sixth day. Western Electric 2–A Audiometer Test.

D. Results

Comparison Between Groups on Reading Achievement and on the Group Tests of Auditory Discrimination. Means and S.D.'s for experimental and control groups on reading achievement and on the three group tests of auditory perception of speech are given in Table XII. The differences in means between the two groups are not consistently in one direction and none is statistically significant. The S.D.'s of the experimental group are larger than those of the control group but the differences are not shown to be significant. The absence of difference in the reading achievement of the two groups rules out the likelihood that the speech defects of the experimental group are part of a general language disability. Their deficiency in speech appears to be unrelated to their silent reading achievement.

* The reading achievement tests used were: For 6th grade, the Iowa Silent Reading Test, Form B, published by the Bureau of Educational Research and Service, State University of Iowa, Iowa City, Iowa. Grades three through five, the Gates Silent Reading Test, published by the Bureau of Publication, Teachers College, Columbia Univ., N. Y. Grade two, the Gates Primary Reading Tests, same publisher.

TABLE XII

COMPARISON BETWEEN ELEMENTARY SCHOOL EXPERIMENTAL AND CONTROL GROUPS ON TESTS OF THE EXPERIMENTAL BATTERY

(N = 21 experimental and 61 control cases)

Group	Grade achievement in silent reading		Travis–Rasmus		Complex Speech Sound Disc.		Speech Sound Memory	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Experimental	5.17	1.96	18.0	14.36	8.71	6.23	16.62	14.40
Control	5.17	2.31	15.10	8.95	7.33	3.44	18.74	10.09
Difference	.00		2.90		1.39		2.12	
S.E. Diff.	.52	3.34	3.34		1.43		3.40	
CR	.01		.87		.97		.62	

The means found on the Travis–Rasmus test in the present study differ widely from the means found by the authors of the test at the time of its standardization.[12] They found a mean for fourth and fifth grade defectives of 27.0 errors and for normals of 5.0 errors. Their second and third grade defectives showed a mean of 19.6 and the normals of 8.1. Several possible reasons for the difference in results were discussed in presenting the results for Experiment I. In the present study the defectives show a larger S.D. as do defectives in the Travis–Rasmus study, but the difference in S.D.'s as in means is not shown to be statistically significant.

Comparison Between Groups on 2-A Audiometer Measures. Results of the 2-A Audiometer tests are presented in Table XIII. The mean of each group at each frequency is shown for the right and left ears separately. Again, as with the university freshmen, all differences are consistently in favor of the control group at every 2-A Audiometer frequency, though no single difference is shown to be statistically significant. The 2-A Audiometer threshold curve for both groups is approximately normal if allowance is made for the low output of the audiometer at 4096 and 256 cps. As with the freshmen, the S.D.'s of both groups tend to be greater

TABLE XIII

COMPARISON BETWEEN ELEMENTARY SCHOOL EXPERIMENTAL AND CONTROL GROUPS ON THE 2-A AUDIOMETER*

[N = 18 Experimental and 51 Control Cases]**

Group		Right Ear: Decibels above the normal threshold Frequencies in cycles per second							
		64	128	256	512	1024	2048	4096	8192
Experimental	Mean	.56	1.39	— .83	1.67	3.61	—2.22	—7.78	—8.61
	S. D.	12.01	11.88	12.28	12.36	11.16	7.49	13.36	15.53
Control	Mean	1.86	2.25	1.18	4.22	4.90	1.27	—3.92	2.55
	S. D.	6.71	6.67	5.74	5.63	5.64	6.17	10.77	11.04
Difference in Means		1.31	.87	2.01	2.55	1.29	3.50	3.86	11.16
S. E. Diff.		2.98	2.95	3.00	3.02	2.75	1.97	3.49	3.97
CR		.44	.29	.67	.84	.47	1.78	1.10	2.81
Group		Left Ear: Decibels above the normal threshold							
Experimental	Mean	1.67	2.78	.56	4.72	3.61	.83	—6.39	—3.33
	S. D.	8.66	6.71	5.24	4.85	7.03	6.29	7.60	13.12
Control	Mean	4.80	4.22	2.45	4.80	6.47	2.84	—3.24	—1.76
	S. D.	7.14	6.37	6.45	6.26	6.74	6.66	10.09	13.05
Difference in Means		3.14	1.44	1.90	.08	2.86	2.01	3.15	1.57
S. E. Diff.		2.27	1.82	1.52	1.44	1.91	1.75	2.28	3.59
CR		1.38	.79	1.24	.06	1.50	1.15	1.38	.44

*The results of testing many normal ears on the audiometer used in this study indicated that the intensity at 4096 cps was between 5 and 10 decibels lower than that indicated on the calibrated intensity scale, and that at 256 cps the intensity was between 0 and 5 decibels too low also. The data, however, are presented exactly as found, without correction, since all cases would be affected equally. Corrections can be made by the reader if desired.

**Three experimental and 13 control children did not have the 2-A Audiometer Test.

TABLE XIV

COMPARISON BETWEEN ELEMENTARY SCHOOL EXPERIMENTAL AND CONTROL GROUPS ON VARIOUS COMPOSITE AUDIOMETER MEASURES

[N = 18 Experimental and 51 Control Cases]

	2-A Audiometer								
	Mean No. of DB's above normal for all 8 frequencies combined			Mean No. of DB's above normal for the 3 middle frequencies (512, 1024, 2048)				Mean No. of DB's above normal for both ears	
Group	Left Ear	Right Ear	Both Ears	Left Ear	Right Ear	Both Ears	Best Ear	Ave. of lower 4 freq.	Ave. of upper 4 freq.
Experimental Mean	.57	—1.52	— .49	3.07	1.02	2.04	5.28	1.57	—2.54
S. D.	4.90	10.44	5.86	5.22	9.82	5.82	3.70	7.26	5.93
Control Mean	2.58	1.79	2.18	4.70	3.46	4.08	5.66	3.24	1.45
S. D.	5.40	4.64	4.58	5.51	4.70	4.73	4.66	5.56	5.52
Difference in Means	2.01	3.31	2.67	1.63	2.44	2.04	.38	1.66	4.00
S. E. Diff.	1.38	2.55	1.52	1.45	2.41	1.52	1.10	1.88	1.60
CR	1.46	1.30	1.76	1.12	1.02	1.34	.34	.88	2.50

at the upper two frequencies than at lower frequencies. Possible reasons for this have already been discussed in Experiment I. The S.D.'s of the experimental group tend rather consistently to be larger than those of the control group though no significant difference in S.D.'s is found at any frequency. A study of individual audiograms in both groups revealed no significantly greater proportion in the experimental group of hearing losses over 15 decibels, at any frequency.

Composite measures of the entire eight frequencies, of the middle frequencies and of the four lower and four upper frequencies are presented in Table XIV. Again, all differences are in favor of the control group but no single difference shows statistical significance. There is seen to be no evidence of high frequency hearing loss in the speech defective group.

Intercorrelations of Tests in the Experimental Battery. Intercorrelations between IQ, reading achievement and tests of the experimental battery are shown in Table XV for the experimental and control groups separately. In the experimental group there is a statistically significant correlation between IQ and each of the three group tests of auditory discrimination. The same correlations approach significance in the control group in two cases. Reading achievement and IQ are not shown to correlate significantly in either group. A significant correlation is approached between reading achievement and the Speech Sound Memory and Complex Speech Sound Discrimination tests in both groups. The

TABLE XV

INTERCORRELATIONS BETWEEN TESTS OF THE EXPERIMENTAL BATTERY, FOR THE ELEMENTARY SCHOOL EXPERIMENTAL AND CONTROL GROUPS

Test	IQ	Reading achievement	Travis-Rasmus	Complex Speech Sound Disc.	Speech Sound Memory
Elementary School Experimental Group (N=21)					
2-A Audiometer	.08 ± .16	—.06 ± .16	.01 ± .16	—.08 ± .16	—.20 ± .15
Speech Sound Memory	—.61 ± .09	—.40 ± .12	.44 ± .12	.61 ± .09	
Complex Speech Sound Disc.	—.75 ± .06	—.45 ± .12	.68 ± .08		
Travis-Rasmus	—.69 ± .08	—.19 ± .14			
Reading Achievement	.22 ± .14				
Elementary School Control Group (N=61)					
2-A Audiometer	.17 ± .09	.20 ± .09	—.003 ± .10	—.10 ± .10	—.03 ± .10
Speech Sound Memory	—.03 ± .09	—.24 ± .08	.11 ± .09	.47 ± .07	
Complex Speech Sound Disc.	—.24 ± .08	—.24 ± .08	.32 ± .08		
Travis-Rasmus	—.30 ± .08	.03 ± .09			
Reading achievement	.14 ± .08				

three group tests tend to show a positive but not high intercorrelation. The 2-A Audiometer measure used in the intercorrelations was the average of the three middle frequencies of the best ear. No significant correlations are shown in either group between the 2-A Audiometer and any other test. The correlations for the elementary school children are of the same order of magnitude as those found for the freshman groups, Table III, on corresponding measures.

Errors in Articulation. Articulation errors are listed in Table XVI in order of their frequency in the speech defective group. More general articulatory defects and defects in voice quality are also listed in the table. Any defects of control group children were very slight, barely detectable. The order of frequency is almost the same for children as for both large and small freshman defective groups, Tables IV and VII. The fricatives s, z, ʃ, ʒ, θ, ð, ʍ, and the plosives ʤ and tʃ are the only sounds missed with great frequency in any group. A few very young children showed a carry-over of infantile substitution of w for r. Very few vowels or diphthongs were missed by any group, the most frequent ones being ɑ, aɪ, and ɑU. The articulatory defectives showed a greater proportion of cases with poor voice quality than did the control group.

The fricatives and plosives listed above as frequent articulatory errors were also found by Fletcher[3](p. 76) to be among the sounds having the highest frequency components. Some of them are also among the sounds lowest in speech power.

The sounds occurring frequently as articulatory errors tend to be among the sounds acquired latest in the normal course of speech development. Wellman and associates[13](p. 44) found in a group of six year old children that initial s was still given correctly by only 74.1 per cent, initial z by 77.7 per cent, initial ʤ by 81.5 per cent, initial ʍ by 74.1 per cent, θ by 74.1 to 88.9 per cent depending upon its position in a word, final ð by 26.9 per cent and ŋ by 55.5 per cent. The sounds ʃ, tʃ and ʒ were missed by only a small number of Wellman's six-year-olds, although they occur relatively frequently as articulatory errors.

It is probably not due to chance that the order of sounds is so similar for lateness of acquisition in normal development, for frequency of error in articulation at later ages and for physical characteristics of frequency and speech power.

Analysis of Errors on the Travis–Rasmus Speech Sound Discrimination Test. The sound pairs missed by five or more cases in the experimental group with their correspond-

TABLE XVI

ERRORS IN ARTICULATION OF ELEMENTARY SCHOOL EXPERIMENTAL AND CONTROL GROUPS

[N = 21 Experimental and 64 Control Cases]

	Experimental group		Control group	
Defective sound	No.	% missing sound	No.	% missing sound
s	19	90.5	15	23.4
z	10	47.6	2	3.1
ʃ	10	47.6	1	4.7
tʃ	9	42.9	1	1.6
ʤ	7	33.3		
ʒ	6	28.6		
ʍ	5	23.8	2	3.1
θ	5	23.8		
r	4	19.0	2	3.1
ð	2	9.5		
ŋ	2	9.5		
ɑU	1	4.8	5	7.8
m	1	4.8		
n	1	4.8		
p	1	4.8		
aɪ	1	4.8		
Sound substitutions	7	33.3		
Lisp	11	52.4		
Oral inactivity	9	42.9	3	4.7
Oral inaccuracy	7	33.3		
Poor voice quality	5	23.8	8	12.5

TABLE XVII

COMPARISON OF ELEMENTARY SCHOOL EXPERIMENTAL AND CONTROL GROUPS ON ERRORS ON THE TRAVIS–RASMUS TEST

[N = 21 experimental and 64 control cases]

Sound Pair	Experimental group			Control group		
	Rank*	No.	Percent	Rank*	No.	Percent
θa–fa	1.	14	66.7	1.	38	59.4
ha–pa	2.5	11	52.4	2.	36	56.3
ða–va	2.5	11	52.4	3.	29	45.3
tʃa–ʃa	5.	10	47.6	49.	6	9.4
wa–ʍa	5.	10	47.6	6.	25	39.1
dʒa–ʒa	5.	10	47.6	5.	26	40.6
ba–va	7.5	9	42.9	4.	27	42.2
ʃa–ʒa	7.5	9	42.9	10.	18	28.1
fa–va	9.	8	38.1	16.5	14	21.9
a–A	10.5	7	33.3	10.	18	28.1
wa–ʍa	10.5	7	33.3	16.5	14	21.9
e–ɛ	12.5	6	28.6	16.5	14	21.9
va–va	12.5	6	28.6	27.	11	17.2
sa–za	16.5	5	23.8	20.5	13	20.3
ra–wa	16.5	5	23.8	35.	8	12.5
ja–ja	16.5	5	23.8	35.	8	12.5
na–na	16.5	5	23.8	10.	18	28.1
e–e	16.5	5	23.8	23.5	12	18.8
U–U	16.5	5	23.8	8.	19	29.7

* See note to Table IV for method of ranking.

ing rank order of difficulty and comparative results for the control group are shown in Table XVII. Comparison with Table VI showing results for freshmen reveals a striking similarity in the two lists. The same pairs are missed frequently by both children and adults.

As with freshmen, sounds missed most frequently in articulation, s and z were not often missed by the children in the discrimination test. The next most common articulatory errors, ʃ, tʃ, dʒ, ʒ, ʍ and θ were found a little more often among discrimination errors than were s and z, but probably not to exceed chance frequency. A few individuals seemed to show more discrimination errors corresponding to their articulation errors than did others, but, if allowance is made for the fact that some of these sounds occur in the discrimination pairs most often missed by the population as a whole—irrespective of articulation errors—there is a probably little relation between the two. If any relation exists in an occasional case it could be much better discovered and with more economy of time by presenting a few selected discrimination pairs involving sounds missed in articulation by that particular person.

Analysis of Error Types on the Complex Speech Sound Discrimination Test. Comparisons were made between groups of the percentages of errors of each type. There were no significant differences between control and experimental groups in frequency of any error type. Error types showed about the same rank order as shown in the freshman groups of Experiment I. Consonant errors were more frequently found in the elementary school groups, but sound additions and omissions again slightly exceeded vowel changes or transposition of sounds in frequency of error. No differences were great and probably none significant.

Analysis of Errors on the Speech Sound Memory Test. The mean number of errors for each series of ten items was compared for the two groups and again, as with the freshmen in Experiment I, no significant differences found. Again, too, the vowel series showed slightly fewer mean errors per series than did consonant series of the same length, but the differences between consonant and vowel series were not so marked as for the freshman groups. The test for elementary school children was, of course, easier than the test for freshmen, but in the series which overlap—series of four consonants and of five vowels—the freshmen, as would be expected, made a smaller mean number of errors than the children. In the series of four consonants the means for the elementary school groups are 3.24 and 3.73 and for the fresh-

man groups .63 and .67; in the series of five vowels, 4.43 and 5.52 as compared to 1.09 and 1.49 for the freshmen.

Comparison Between Groups High and Low in Auditory Acuity. Since hearing loss at high frequencies should have an effect upon discrimination of some speech sounds, all cases from both experimental and control groups having an average loss of 3.0 decibels or more for the upper four frequencies for both ears were compared with all cases showing an average of 3.0 decibels or more above the normal threshold. No significant differences were found between these two groups on any of the three group tests of auditory discrimination.

E. Conclusions

1. No significant differences were found between defective speakers and normal speakers in ability to discriminate between simple pairs of speech sounds, to discriminate sounds in a complex auditory pattern occurring in a meaningful context, or in auditory memory for speech sounds.

2. A significant difference was not found between defective and normal speakers in silent reading achievement.

3. On the 2-A Audiometer differences at every frequency were in favor of the control group but no differences were statistically significant. All composite measures on the 2-A also failed to show significance although all were in favor of the control group.

4. Both groups showed a relatively normal threshold curve.

5. None of the correlations of 2-A Audiometer results with the three group tests of auditory perception or with reading achievement or IQ was significant.

6. Correlations between reading achievement and two of the auditory tests—the Speech Sound Memory and Complex Speech Sound Discrimination — approached significance.

7. Significant intercorrelations were found for the three group tests of auditory perception, and all showed a significant correlation with IQ particularly in the experimental group.

8. The nine articulatory errors found most frequently were in order: s, z, ʃ, tʃ, dʒ, ɜ, ʍ, θ and r.

9. Poor voice quality was about twice as frequent among articulatory defectives as among normal speakers.

10. Little relation was found between errors in speech sound discrimination and errors in articulation.

11. In both the Speech Sound Memory and Complex Speech Sound Discrimination tests vowels seemed easier to discriminate and remember than consonants.

12. A group high in auditory acuity at the upper four 2-A frequencies showed no superiority over a low acuity group on any of the group tests of auditory perception of speech.

Summary and Conclusions

The purpose of the study was to compare functional articulatory speech defectives with normal speakers in regard to a series of auditory processes ranging in complexity from simple acuity to discrimination and memory of complex speech patterns. The comparison was carried out at two widely separated age levels. In Experiment I university freshmen were studied. Eighty-three functional articulatory speech defectives were matched with eighty-three normal speakers on the basis of age, sex and intelligence. The two groups were compared as follows: (1) on the 2-A Audiometer which tests acuity for pure tones at eight frequencies; (2) a test involving simple discriminations between pairs of speech sounds; (3) a test involving discrimination of speech sounds in a complex pattern occurring in a meaningful context; and (4) memory for series of speech sounds.

In Experiment II elementary school children were studied. Twenty-one functional speech defectives ranging in age from seven to thirteen years were matched with sixty-four normal speakers of the same age range, on the basis of age, sex and intelligence. IQ's of the experimental group ranged from 79 to 129, those of the control group from 82 to 120. The two groups were compared on the first two tests mentioned in Experiment I, and on a simplified form of the last two tests.

The following general conclusions were reached:

1. Functional articulatory speech defectives at either a university freshman or an elementary school level were found to show no inferiority to normal speakers on measures of auditory acuity, auditory discrimination of either simple or complex speech patterns or on auditory memory for speech sounds.

2. Low or zero correlations were found between articulation ratings and all of the

auditory tests, between the 2-A Audiometer and all the other auditory tests, between the 2-A Audiometer and measures of general ability or IQ. Medium correlations were found between general ability or IQ and each of the three tests of auditory perception of speech, and between each two of the three auditory perception tests.

3. There was close agreement between the two age levels in the articulatory errors occurring most frequently. The seven most common errors for all groups occurred on the following sounds: s, z, ʤ, tʃ, ʃ, ɱ and ʒ. All but ʤ and ʒ were also among the first ten in Barnes' study.[1] In all groups consonants far exceeded vowels in frequency of error.

4. Speech defectives and normal speakers at both age levels agreed closely on sound discrimination errors made most frequently, but these errors—for the speech defectives—were found to have no relation to articulatory errors.

5. Articulatory defectives at both age levels showed more voice defects than did normal speakers.

6. Detailed analysis of the auditory perception tests revealed that for all groups vowels were consistently more easily discriminated and more easily remembered than consonants. They were also less frequently found as articulatory errors.

7. Cases with better than average auditory acuity showed no superiority to cases below average in acuity in mean number of errors on the three auditory perception tests.

Discussion

It would seem evident from the results of this study that deficiency in auditory acuity, either for the entire frequency range or for high frequencies only, is not a differentiating factor between normal and defective speakers, and, consequently, should be abandoned as a generalized explanation of functional articulatory defectiveness. The writer does not mean to deny the well established facts in regard to the serious effects of hearing loss upon the development of good articulation. However, these facts do not justify a reverse type of reasoning to the effect that functional articulatory defects exist because of some obscure deficiency in auditory acuity.

Nor is there any more evidence for auditory deficiencies at more complex levels of integration as an explanation for articulatory defects. Response to complex auditory patterns involves a large measure of general intelligence, as evidenced by the intercorrelations found in this study. Therefore, when groups are carefully equated for general intelligence, differences in the higher auditory integrations fail to appear. Results found in the past on auditory memory span, for example, were probably due to differences in general intelligence, in which auditory memory span—or any type of memory span—is a factor, rather than to specific disability in this trait. This explanation is especially plausible in view of the fact that there is usually a larger percentage of children with low IQ's among articulatory defectives than among normal speakers.

The absence of relationship is further born out in the small degree of identity between errors in sound discrimination and errors in articulation in individual cases.

Results of intercorrelations in this study would seem to indicate that ability in discriminating between sounds in complex patterns and remembering series of speech sounds is more probably a function of general intelligence than of auditory acuity. This absence of relationship between acuity and complex auditory integrations bears out the findings of Howells and Schoolland cited in the introduction.[8] They, too, found auditory perception of speech more closely related to intelligence than to acuity.

Within the limits of this study and its attempt to measure auditory processes over a fairly wide range of complexity, so-called functional articulatory speech defectives as a group appear to possess no auditory deficiencies to account for their speech handicaps. This leaves us with the possibility of either still further analysis of the auditory functions or of search for etiological factors in other directions.

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PROJECTIVE METHODS IN THE PSYCHOLOGICAL STUDY OF CHILDREN

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In recent years there has been a growing tendency to supplement paper and pencil techniques of studying attitudes and personality with a variety of other methods. Promising among these are the various toy and picture methods for revealing conscious and unconscious layers of motivation and personality, attitudes and needs important for teachers to understand. Three major streams of influence have flowed together to produce this trend. The first is the use of pictures and toys in the measurement of intelligence: pictures have been used in the various revisions of the Binet tests for nearly thirty years, while form boards, picture-completion tests, etc. have been used in well-known "non-verbal" tests almost as long. For these purposes the functions to be studied are primarily those of comprehension, analysis and synthesis or other intellectual functions observed without attention to personality factors which condition their operation. In experimental circles, toys or pictures have been used by Deutsch, M. C. Jones, Allport, Bonham and Sargent, Marston, Murphy, R. and E. Horowitz, Lewin and his followers for a variety of purposes. Statements of preference for one out of a number of houses, dresses, etc. were used by Deutsch as an index of social conformity; similar procedures such as the choice of "Which is best" and "Which do you like" from standard prepared pictures have been used to study social and race attitudes by R. and E. Horowitz. Responses of two-year-olds to a suitcase of toys were used by Bonham and Sargent as a basis for personality ratings of pre-school children. Marston's now classical experiment to measure introversion-extroversion among small children used standardized toy situations to elicit behavior.

At quite a different level of scientific analysis, the Rorschach ink-blot test was developed as an instrument for diagnosis of personality structure. In contrast to all the procedures mentioned above it used standard but relatively unstructured material—the vague indefinite forms of ink blots which permitted free association and projection of unconscious patterns of perception as well as fantasy. To a large extent behavior, which was the main focus for study in the Marston experiment, has been ignored in the use of the Rorschach.

Equally far from the standardized approach of the test and experimental traditions has been the use of pictures, toys, and dramatic play by the clinical group primarily interested in diagnosis and therapy. Melanie Klein's original use of toys during the process of child analysis was followed by a considerable spread of the use of play techniques and art materials notably by Schilder and Bender, Despert, Griffiths, Homburger. Dramatic methods of achieving catharsis, insight and rebuilding of integrated constructive attitudes have been most fully developed by J. L. Moreno with adolescents and adult patients. A more controlled use of dramatic play with dolls was developed by M. D. Fite in the experimental study of children's attitudes toward aggression.

To methods of this sort L. K. Frank has applied the term "projective techniques",[1] focussing attention upon the revelation of unconscious attitudes or feelings through means which avoid committing the subject upon issues explicitly formulated. Apart from this common purpose these methods vary enormously and it is the purpose of this article to point out a few of the major differences in their functions.

These differences may be seen most easily in terms of variations in *materials* used, and in *methods* followed in the experimental procedure. A fundamental difference in materials relates to the quality of *plasticity* or degree of formal structure which the material has as presented to the child, and which determines the range within which the child's projective responses are free to be exposed. For example, clay, finger-paints, dough, mud are examples of extremely unstructured materials which invite spontaneous projection of patterns of movement and feeling and may be used to develop patterns of definite fan-

[1] See forthcoming article by L. K. Frank.

tasy content as well. Feathers, balloons, rubber bands and other material offer similar possibilities and may be considered relatively unstructured. Similarly ink blots, vague dim pictures whose forms are not too clear, or pictures of the pure "design" type may be used to elicit free associations, or qualitative responses significant for interpreting sensory-emotional aspects of experience.

Conflict or guilt feelings regarding messiness are apt to be brought out by dough or mud; repressed aggressive impulses may be stimulated to expression by offering balloons to be exploded, cars with sparking guns, rubber knives, scissors with material to cut or block structures to be knocked down. Emotional trends toward melancholy or gaiety may appear in preferences for or resistances to music of different types and for colors of emotional value to the child. Preoccupations with food, toilet functions, or sex may appear in "free" play with household toys while inhibitions or conflicts regarding people may appear in the avoidance of dolls. Free movement among a variety of materials and functional creative use of them in contrast to stereotyped routine uses may indicate basic spontaneity or inhibition; these basic patterns of independence or reliance upon authority frequently determine the child's response to different types of "progressive" or "conservative" school treatment and are important to analyze in formulating any educational plan for a child.

Both pictures and play material of this sort contrast markedly with material of the relatively formal or definitely structured types. In this latter group we include dolls actually representing different age, family, race, or economic class roles: babies, big brothers, big sisters, mothers, fathers, grandmothers, nurses, "rich", "poor", "negro". Conventional toys—balls, cars, trains, household furniture and other toys of definite or stereotyped function are considered "highly structured" material which in general elicits a narrower though equally significant range of projected feeling patterns and behavior. Toys of this sort may have the limitation that purely conventional patterns are harder to distinguish from spontaneous play of special emotional value to the child. Since "representative" forms of dramatic play are constantly carried out with these toys moreover it is not easy to distinguish them from symbolic forms which may point to underlying conflicts or compulsions. When symbolic material of special personal value to the child is sought, it is probable that relatively unstructured or vague material will be more fruitful.

Photographs of clear-cut definite situations where individual objects fit into a specific unequivocal interpretation are examples of the highly structured material in the picture area. Here again "projections" appear unequivocally only when the obvious interpretation is distorted or when alternatives are present.

The second major difference that was mentioned was that of method. A child may be given either completely plastic or very formal materials with the suggestion merely to "do what you like", or with either type of material tasks may be set which afford various degrees of freedom. For instance, "make a play" affords freedom within definite boundaries; "We'll call this doll Johnnie and this one Teddy, now make Johnnie hit Teddy" defines the task or structuralizes the situation sharply. With either vague, unstructured pictures or sharply defined ones, any of the following procedures may be used, ranging from most free to most definite: "Tell me about it"; "Tell me a story about it", or "What are they doing"; or a definite multiple choice technique which asks: "Which is best"? "Which do you like"? "Which does a good Mommy do"? "Which do you do"?

In each of these different levels of freedom or definiteness in procedure the adult has a different relation with the child and the situation; in the free play situation the adult remains passively on the sidelines, taking notes, or leaves the situation entirely (taking notes from a "one way" screen); the adult may also remain relatively passive in the semi-free situation following the suggestion to "make a play". As soon as the adult undertakes a procedure like "make Teddy hit Johnnie", he becomes involved in the situation more actively; his very suggestion implies an attitude of acceptance toward the behavior he suggests, and in this type of experiment subsequent procedure usually involves interaction between child and experimenter.

These differences between relatively free and formal materials and methods are important in determining the range of mechanisms which may operate in the child's re-

sponses: If a child shows fear in response to a picture of an alligator when he has previously been afraid of a real alligator we may conclude that a simple response by analogy is operating; when a child sees a picture of a child inside a fenced-in playground and responds "He has to stay there all day and all night Monday, Tuesday, Wednesday, Thursday, Friday" we suspect projection of anxiety regarding confinement. When a child gives his own name to a picture of a child crying we infer a process of identification. The examples of projection and identification just given could only appear in the use of relatively free methods of approach. The advantage of these free methods is that current problems, anxieties, or preoccupations of the child are likely to be most readily exposed and that the child's way of perceiving or organizing experience is more spontaneously revealed; the disadvantage is that without more specific narrowing of the field, the precise attitudes sought by the experimenter may not be revealed. Since the literature has given fuller attention to the types of insight regarding personality problems that emerge in the freer kinds of projective situations, the rest of this article will be devoted to suggestions regarding uses of the more definitely structured materials and techniques.

While projective techniques in more definitely structured forms do not give the free play to the personality of the child that the unstructured forms do, they have their own appropriate uses. Properly planned, they can, like other play situations, be used with very shy children, non-verbal children, and very young children. While permitting, in fact requiring, projection of inner patterns upon the material presented, the structured techniques control and point the data elicited so that they appear in the direction pertinent to the investigator's specific interest. Such methods of investigation seem most promising when used for objective checking of some specific theory or of some part of a theoretical orientation concerning the dynamics of personality functioning. In so far as they are concrete and controlled they are amenable to manipulation in a given direction.

In exploring children's ideas about themselves, it has been found useful to restrict the child to a choice between two pictured situations. Since the study was conceived in terms of comparison, comparing the child's ideas about his position in his world with the observable reality, it was important to elicit responses in such terms. For example, the simplest of the pictures showed two children, one larger than the other, with sex indistinguishable, and the subject was asked to identify one of them as himself. In some cases it was found that the children had in mind younger siblings at home and identified themselves then with the larger child. When, however, siblings were both younger and older, the identification was held to be indicative of the role that bore most weight for the subject, that of being big brother to the littler ones, or that of being little brother to the bigger. Actually, in relation to the nursery school situation in which the test was given, he could be either with verisimilitude in most cases. His answer might indicate also which role it was important for him to assume in any interpersonal relation with another child. Which of these categories his answer actually fell under could be determined by checking with the actual data of his familial position. Still in the "simple" category, but offering a wider and more specifically defined choice was a page containing pictures of 4 children, of the same sex as the subject, but differing in ages. They might be labelled "baby", "nursery school age", "elementary school age", and "adolescent". Here the subject was again asked to identify himself, and this identification was usually unequivocal in meaning.

Using this kind of technique it is quite possible to establish "norms" of what children in given pre-school age ranges know about themselves. With such groups of data available, it should be a simple matter to pick out the deviants for intensive study. This kind of singling out may give the cue to an understanding of the child who is vaguely "different", who somehow is always on the fringe of the group, who cannot participate in group activity on the same level as the rest of the group.

The variety of situations that lend themselves to this type of investigation seem limited only by the ingenuity of the investigator in finding or designing adequate pictorial presentation. In a study now planned, it is the intention of the investigator to explore the child's conception of self, parents, siblings, and teachers; home "tone", status in home situations; status in school situations;

status in group situations involving own age children. Concerning himself, the child may be asked to choose between a self that eats without help and a self that has to be fed; a picture of a child tying his own shoes, and a child having his shoes tied for him; a child putting on a coat himself, and a child getting aid in donning his coat. He may be asked to identify himself in a variety of pictured activities: playing alone with blocks, or as a member of a group engaged in block play; walking a plank high above the ground or just watching someone else walk the plank; as the person on the receiving or the aggressive end of a fighting scene. In the same way he may be asked to identify his mother, his father, his teacher, his brother. A picture of a frowzy mother and a neat mother may be presented. "Which is your mummy?" A frowning and a smiling daddy should be easy to choose between. A parent boxing a child's ears or spanking and a parent caressing; two parents, quarreling or smiling at each other; a family scene in which the children and parents seem occupied happily in cooperative endeavor and one in which the children are being punished and are fighting with each other; all these should yield fruitful evidence of the child's conceptions of the situations indicated. It is probable that some of the situations presented as contrasting are really co-existent in reality, but in forcing a choice, we can get at an indication of which one is most prominent in the mind of the child. This subjective evaluation seems to be the basis for most of the mechanisms seen as necessary in making adjustments to the world we live in, and therefore has a peculiar value in the inwardly conceived world of the child. It would be necessary to check, of course, to be sure that some transitory state or recent event is not responsible for the child's choices. Such a check could be very simply made by giving the test again after a suitable interval. If the child's responses are unreliable, it would be pertinent to get a diary record of the child's life just before the tests were given, and to evaluate the influence of specific events and defined sets of circumstances. Should it be found that these are reflected in the child's choices, the picture tests then become a way of tapping the duration of effect of these unitary bits of experience.

A variation in procedure with the same pictures suggests itself. In the suggestions just discussed, the child was asked to identify the situation as he saw it, to answer the question "Which is yours?" At a repetition of the presentation of the series, the question "Which do you like best?" should give a fairly accurate measurement of two important items: the degree to which the child places desirable but incongruous interpretations upon observable facts, (for this a check of the observable facts would be necessary); and the gap between the world he perceives and the world he desires.

As indicated above, one of the main values of this type of pictorial technique is the possibility it opens of tapping emerging conceptions of the world at an age when verbalization is not yet satisfactory. In so doing, it may permit the emergence of such concepts before they have become obscured by a realization on the part of the child of the social reaction they elicit, before he knows whether they are approved or disapproved, and before he has a chance to develop concepts conforming more with the approved pattern of the group in which he is growing up.

It should be useful to evolve a technique which would give a picture of the child's habitual reactions to certain discriminatory situations. For example, a series of pictures in which a child (or several children) is involved in truly critical situations might be presented. Other pictures might present situations which could be critical if the child had not the skill for handling them. Still other situations might be presented which are not normally even incipiently critical. The children involved could have blank faces, with a slot in each to permit the affixing of separate faces. The subject might then be asked to choose one face of a possible three, each with a different expression, to affix to the pictured child. There could be a fearful or crying face, a laughing face, and an irrelevant face, perhaps sleeping. The choice the child makes should indicate several things: the emotional value that situation carries for the child; the awareness of the child of the kind of demeanor which gets approval in his group; the child's ability to estimate correctly the appropriate responses to the different grades of situations presented. These choices could be interpreted in terms of security and degree of objectivity. In this case the ad-

vantage of the pictorial technique over actual observation is the possibility of widespread study utilizing relatively untrained people for the gathering of data.

Pictorial techniques lend themselves admirably to tapping the child's awareness of current mores and to some measurement of the degree to which they pattern his conceptions. For example, in one investigation of the development of children's social attitudes, the subjects were presented with a page containing five pictures which it was possible to pattern in two different ways, either intellectually sound. The subject was asked, "Which one does not belong?", and by his choice indicated which pattern was for him the dominant one. There was a page containing three boys, one girl, and one adult man. The subject could choose to eliminate the man, indicating that the pattern of age was paramount for him. He could choose to eliminate the girl, indicating the importance of sex in his conceptions of social groupings. There might be three white girls, a Negro girl and a white boy. In that case he would have an indication of the strength of sex over race groupings.

In the study referred to the relative dominance of four kinds of possible patterning was tested: race, age, sex, and economic status. Each was matched against each: race against age, race against sex, race against economic status; age against sex, age against economic status; sex against economic status. It is conceivable that other types of patternings could be checked by the same procedure.

In another controlled pictorial technique, the subject is asked to project a value. In the specific study for which it was designed, the investigator attempted to measure the extent to which adult standards in relation to various material aspects of living had been accepted by the growing children. There is no reason to believe that the same kind of test could not be developed to tap subjectively developed values as well as values interiorized from the social milieu. The items for this particular form of the test were chosen as possibly representative of important aspects of living in the culture. They included landscapes, houses, dishes, clothing, sport, dancing, flags, cities, kinds of work for men and women. One page of a large scrap book was prepared for each item. On this page were pasted pictures giving several possible choices. Each child was asked "Which is the best _____?" The questions included such items as "the best place to live (landscapes)"; "the best house to live in"; "the best kind of dishes to use"; "the best way for a boy to dress"; "the best way for a girl to dress"; "the best work for a man to do"; "the best work for a woman to do"; "the best sport"; "the best city to live in"; "the best way to dance"; "the best looking flag". Inasmuch as any of the choices presented on any single page might have been adjudged "best" according to different frames of reference, in order to make the choice, the child had to act in accordance with a particular kind of orientation, functioning subjectively. After the first choice had been indicated, the next four choices were given in the order in which they were preferred. The subject placed cards over his choices as they occurred in order to eliminate distraction and confusion. This kind of ranking was thought to make possible scoring on a more subtle basis than a single "best". As each group of pictures contained some representation of the ascertained familiar, the force of familiarity in determining the value judgments of the children could be measured. For example, in the set depicting cities, one picture was noticeably like the county seat to which these children made weekly trips. The range of houses included a cabin and a palace, but offered several which resembled closely types of homes indigenous to the community.

The clearest indication of the accretion of culture values came out in responses on a flag item. The page presented for inspection contained twenty-four different flags. The children were asked, as in the other items, to rank their choices in order of preference in answer to the question, "Which is the best looking flag?" The youngest children tended to choose the Siamese flag, with its white elephant on a red background. As the older children were tested, another trend was noticeable. They tended to choose the American flag, or flags containing elements similar to those that make up the American flag, stars, stripes, and the three colors. Finally, the American flag was almost the invariable first choice, and all the other rankings were given to flags bearing some resemblance to the flag of the United States.

The possibility of checking the earlier stages of awareness of external circumstances and conditions opens a whole line of inquiry into assimilation of culture values. Pictorial techniques make it possible to get some measure of the child's interiorization of concepts before verbal organization of such a concept is possible. In one attempt to find out at what level children become aware of economic differences, a series of pictures making use of the common symbols for such differences was devised. There were really two series, each one containing pictures of children, houses, clothing, neighborhoods, furniture. In one series the items were drawn to represent wealth; in the other, poverty. Both were then shuffled together. Pictures of the rich children and the poor children were presented to the subjects, and they were asked to sort the other pictures into two groups, showing which items went with each of the children's pictures. The result was two piles of pictures, indicating "rich" and "poor". At about the third grade the children were sorting the pictures correctly without any difficulty. To use the same materials with much younger children it would be necessary to vary the procedure. Instead of asking the children to keep in mind one theme through the whole series, the investigator could repeat the theme. The picture of the poor child might be presented; then the picture of the rich house and the poor house. The child could be asked to indicate in which house the pictured child belonged. The same procedure could be used for the whole series, repeated with the picture of the rich child as focus. There might be some advantage to presenting the pictures of both kinds of children, and asking the "belonging" question for each item singly presented. Probably only experimentation with the age range in question could determine the best procedure.

One caution is necessary with regard to this use of pictures. If they are too colorful or whimsical or full of other expression, the younger children become so fascinated with the pictures themselves that it is difficult to persuade them to manipulate them according to directions. One must beware, also, that the symbols presented do not include elements that will be interpreted privately by the subjects and then become the decisive factor in the choice. For example, in one of the pictures in the series described above, the poor children seemed to be having more fun than the rich children, and the subjects were more interested in the pictured activity than in the economic status at which the directions were pointed.

By using an identification technique, it should be possible to build a genetic picture of children's progressive differentiation not only between self and not-self, but between self and like-self. For example, in one study of pre-school children in which a series of portraits were used, the children were asked "Is this _____(using name of subject)?" with the exposure of each. While for the most part they willingly lent their names to portraits not remotely resembling themselves, several white subjects balked at identifying themselves with portraits of obviously negroid children. To them they gave the names of Negro playmates. Occasionally they made pointed verbalizations, such as, "No, that's a black boy." Some of the white children, however, said "Yes" to the pictures of Negroes, but objected to identification with adults, saying "That's a mamma," or "That's my big brother." One difficulty with this technique is that some children will say "Yes" to any question put by an adult. To circumvent such responses, it is better to change the directions so that the child responds with a name to each portrait, after being told that he is to tell which ones are pictures of himself. To check further on the child's perception of the task, it would be well to include one picture of the subject in the series, and to check on the subject's experience in identifying himself in family pictures, etc. One three-year-old who said "No" to every picture, also said "No" when asked about his own image in a mirror. Inasmuch as he was cooperative in other tasks during the same session, it seemed unlikely that he was being negativistic. The task may have been beyond his ability to perform.

Although dolls have for the most part been used in free play situations, they may be found useful in techniques intermediate between rigidly structured and entirely free of direction. For example, dressing dolls to represent definite people, such as father, mother, nurse, or Negro, Chinese, etc., sets the stage for investigation in a specific direction. In one study of the development of attitude toward the Negro in white children,

a set of dolls dressed like the "Our Gang" children was presented. They included a Negro doll and a little dog. The children were asked to tell stories about the dolls. During the course of the stories, this statement was made: "They went to Bill's house. The next day Sambo came over to Bill's house to play, and it was dinner time. So Bill's mother came out and called them, and Bill and Sambo and Gyp had dinner". Yet in another part of the investigation, when the same child was shown a picture depicting an eating situation, including a Negro child, she said the Negro did not belong there. The two techniques may be showing up different levels of attitude assimilation, but the results in both cases concern the same focus. Thus the freer phantasy product is obtained about the thing in which the investigator is interested. This kind of semi-directed data can be gathered in almost "natural" situations: parties, the nursery school, play groups.

Another way in which dolls can be used as a projective focus is to suggest to the child identification with a particular doll by giving that doll the child's name. Or the adult may offer himself as the child's agent, allowing himself to be directed by the child in the manipulation of materials or situations. It would seem, however, that use of projection would find its greatest value as a measure of the extension of the child's fears or as a technique to release aggressive impulses which the child fears to release through his own person. To utilize the method for the first end, for example, the child might be asked to go through a situation outlined by the adult. If he refuses or is unsuccessful, the adult might then offer himself to be directed toward various degrees of participation in the suggested situation; for example, "Shall I go near the cage?" "Shall I put my hand in?" "Shall I get in?" The point at which the child refuses to permit the adult to advance might indicate the extent to which his fears taint his environment. In a situation involving an animal, children varied from those who fearlessly approached and manipulated the animal to those who would not permit the investigator to approach, and who were not at ease until it was shut up. The analysis of a child's reaction to this kind of technique would necessarily be complicated. It would involve a consideration of the child's ability to identify with the adult, the extent to which projection of his own fears makes it impossible for him to perceive any difference between himself and the adult; the extent to which the adult represents superior ability to deal with the situation and becomes a vehicle for vicarious satisfaction; and the extent to which the adult is a target for sadistic and masochistic impulses, depending upon the focus in the situation with which the child identifies, the animal or the person. The structuring of technique in this case consists of defined steps in approach and manipulation through which the investigator attempts to propel the child by command or question.

As a possible release for impulses the child in his own person suppresses, the adult might offer to *do* things to puppets, dolls, or materials, or to have symbols for people do things to each other. Again, the comparison between what the child allows himself to do in manipulation and what he directs the adult to do might yield the most fruitful interpretation.

With definitely structured materials to which the child is to respond by stating a choice, it is of course essential to be sure that the child is perceiving the relationships intended as the focus of the study. It has been found useful to accompany exposure of pictures, for example, with a verbal statement, such as this: "This little girl eats by herself, and this little girl is fed by her father." With more verbal children it might be preferable to elicit from the child what the picture is about, or on what basis he is making his choice. Under the latter circumstances, the main value of presenting the pictorial material is to give the child more concrete symbols to work with than he would have on a straight verbal basis. Using the first method, the presentation of pictorial material accompanied by a descriptive statement, it has been found possible to get illuminating interviews from children who were verbally negativistic and with whom it was exceedingly difficult to establish rapport on a verbal level.

There are several limitations to the usefulness of these structured techniques. One must perforce apply some coercion to one aspect of personality, the aspect with which the investigator is concerned. In the individual child this particular facet may be of little importance, or of more importance in

some children than in others. There may be functional determinants in the personality or situation of the child to which the limited technique may give no clue, but which may be important for the interpretation of the results of the investigation on an individual basis. On the whole, the usefulness of these methods lies in areas of gross differences and in the tapping of group differences. While it would be possible to get a picture of fairly subtle differentiations it would hardly be profitable to use this kind of approach for that purpose, because it would necessitate anticipating an almost innumerable number of combinations of situations. For checking hunches gotten by freer techniques, however, even when working with differences between individual children, this type of approach should be very useful. It is equally true that since this type of method is generally less time-consuming than the more leisurely "free play" and relatively less structured methods, it may be useful as a preliminary to the latter to indicate fruitful directions in which further exploration of the child's personality can take place.

It is probable that both the free and controlled toy and play approaches discussed above will be developed rapidly in the next few years; their contribution to the understanding of relations between personality needs and educational processes will provide in time an important context in which to set the study of intelligence and specific abilities.

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ANALYSIS OF VERB FORMS IN THE SPEECH OF YOUNG CHILDREN, AND THEIR RELATION TO THE LANGUAGE LEARNING PROCESS*

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PROBLEM

The purpose of this paper is to describe the grammatical forms used by a number of young children, and to determine the significance of these forms for the process of language learning. It has long been observed that the child's speech is concerned with the child's immediate world, in space and time. The speech records cited in the early part of the paper, collected from children and adults, seem to confirm and illustrate this fact. The later part of the paper will try to show that this "immediacy" of children's speech comes about because the child's learning process works better with "immediate" situations than it does with "remote" situations.

DATA USED

The sample of children's language was taken from the records of twelve four-year-olds, whose speech was taken down by the staff of the Nursery School of the Institute of Child Welfare at Berkeley, California. These records were made during free play and other nursery activities at the school. (For a fuller account of the work here see "A Study of the Growth of Language between Two and Four Years" (1).) The first fifty verbs in each child's record have been tabulated. For comparison a short sample of adult spoken language (100 consecutive sentences) was obtained. These were taken from the record of a conference of a national association, which had been written and transcribed without being edited. The conferees had been gathered in a group of thirty or more, to listen to a series of papers. After the papers were delivered, a period of general discussion ensued.

* Adaptation of two chapters of a thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at the University of California, 1933. The writer is grateful to Dr. Harold Jones and Dr. Edna Bailey for the suggestions and criticisms they gave throughout this study.

PRESENTATION AND TREATMENT OF DATA

The grammatical classification of the verbs in these samples has been taken from Palmer's "A Grammar of Spoken English on a Strictly Phonetic Basis". (4). The verb types found are listed in Table I below. The adult record is seen to show a larger propor-

TABLE I

FREQUENCY OF TENSES IN THE SPEECH OF FOUR YEAR OLD CHILDREN, AND OF ADULTS

Inflection	Adult		Children	
	Frequency	%	Frequency	%
Present	130	59.4	338	56.3
Future Preterite*	24	11.0	6	1.0
Past	23	10.5	71	11.8
Present Progressive	11	5.0	102	17.0
Future	7	3.2	71	11.8
Present Perfect	6	2.7	10	1.7
Present Passive	5	2.3		
Past Progressive	3	1.4		
Past Perfect	2	0.9	1	0.2
Future Passive	2	0.9		
Future Preterite* Perfect	1	0.5		
Future Preterite* Passive	1	0.5		
Past Subjunctive	1	0.5		
Future Preterite Progressive	1	0.5		
Past Passive	1	0.5	1	0.2
Present Progressive Passive	1	0.5		
Total	219	99.8	600	100.0

*"Would" form.

tion of compound tenses than does the children's record. The nursery school sample shows a somewhat greater percentage of present and present progressive tenses combined than does the adult sample. To the extent that a limited sample can act as a control, the adult record is offered as a control on the children's record. Besides the facts summarized in the tables a number of other observations may be made on the records.

At four years, the future tense has come into common use. It is found frequently in each child's record, making up something over 10% of the total speech. Occasionally, the present is substituted for the future in places where the future is regularly called for, as it is following verbs with the "if" form. The present progressive, used in adult speech for many actions taking place in the present time is found to be used regularly and often in the nursery talk. Occasionally the present is used for the progressive form, but this substitution is much less frequently used at four than it is at an earlier age. The present progressive of "go", with an infinitive, as, for example, "I'm going to buy a house" expresses a distinctive time relation that it has almost the force of a separate tense. This form was used frequently by the four-year-olds.

The simple present, early used indiscriminately for most tenses, is relegated to a great extent to the describing of objects on the immediate scene. The adult use of the present to indicate customary action was rarely found. An instance comes from the record of B. H.: "Often I do this." At another time B. H., in talking about the slugs said, "They run about in the yard." The present occurs as a verb of rehearsal or review, describing action expected or desired in the future. The following example comes from the record of B.T.: "Go out, and when you come in, I lock it." The present was not found expressing any true generalization of the type of "All men are mortal," "All that glitters is not gold." No generalizations were found expressing statements of quality or condition. The present indicating customary action was noted. This sort of general statement may be a predecessor of true generalization.

The preterite or simple past is found rather frequently; apparently about as often as we might expect it in adult use. But the past is the immediate rather than the remote past. Only four children made reference to any time earlier than the previous day. In all but one instance, references to the remote past indicated the child's own past. E. T. (age 48 months) made a statement expressing customary action in the past history: "In the olden days, before they had automobiles, they made some, they made some wheels in the olden days out of stone." The difficulty that the child experienced with the sentence may mark it as having for the child an unusual reference.

Some tenses were not to be found in any of the children's records. These follow, and each tense is defined by an example. They are the past perfect, "He had taken it," the future perfect, "He'll have done it," future preterite perfect, "You'd have had time," future progressive, "It will be raining before dark," future preterite progressive, "At eight o'clock we should be working," the past perfect progressive, "They've been doing it for years," the future perfect progressive, "I'll have been wearing it a year then." The entire passive conjugation is missing except for a single instance of the present passive. The conditional and hypothetical verbs were used. These are respectively the present and past tenses following in a sentence introduced by "if." Past participles used as adjectives were present, as in "I'm tired." No absolute constructions were noted and no present participles were found which were used as adjectives.

Among grammatical forms other than verbs, the indirect object and the predicate of result, as in "make him umpire" were not noted. Apposition occurred twice, once correctly and once with a superfluous third personal pronoun.

The present situation may be, and is, referred to by almost all the tenses that there are. The employment of one or another inflection in any given instance appears to be dependent on the taste of the speaker at the moment.

Significance of the Child's Emphasis on the "Present"

In the following pages the importance of the child's language usage will be discussed in the light of how he learns to use the words and forms of that language.

Many features which seem characteristic of grown-up speech are rarely found at four years. The past may be used consistently and correctly, but it is usually the immediate past of the nursery yard, of events that have just happened. The future is likewise used rather often, and correctly enough, but the future too is nearly always the future of the day of speaking. As Lorimer (3) aptly says, the child's reasoning is limited to the Here, and Now, and the Apparent. The remote future of tomorrow and afterward is seldom mentioned. The perfect verb forms, many of which refer only to situations definitely removed from the present, rarely occur. We may say that the child lacks certain language capacities, that he is deficient in "memory," or that he lacks "interest" in remote situations. When we have done this, we have done nothing more than say in three different ways that the child does not talk about remote events.*

Can we say anything more about the child and his concentration on the immediate situation? Let us consider the early stages of language learning, when the first words are being acquired. These words are for the most part names and concrete nouns. Waddle (5) cites the studies of Tracy, Salisbury, and Wolff, which verify this point. These names are not the most frequent words in adult speech. This overloading of early speech with nouns may be explained as a consequence of the greater unity, persistence and stability of nameable objects as stimulus complexes. This is in line with the suggestions of Lorimer (3) who says that substantive concepts are complete in themselves, while verbal and prepositional concepts have fluctuating context. It may be pointed out that articles also are probably learned late in spite of their great frequency in adult speech because they are used in a different situation every time they occur. We do not know how much of the child's vocabulary is contributed by deliberate rather than casual teaching. It might be possible that nouns are in part easily learned because they are taught by adults more than other parts of speech. It is probably true that parents begin by teaching the child nouns, though it is hard to see why this should be done except for the fact that the referents of nouns are more stable than the referents of other speech parts. The child can both learn and be taught the name of an object because the object presents much the same set of stimuli each time it is referred to. The theory of redintegration as stated by Guthrie (2) is that the ease with which an association between a situation and a reaction will be formed depends not on the frequency of chance association, but on the extent to which the situations which are associated with the response resemble each other. The word "rug" will be easily learned because the object it refers to is a relatively stable collection of stimuli. The word "under" is used in a variety of situations which are most diverse from each other. It is not necessary to suppose that nouns "stand out" from their context in order to be learned early.

At the nursery school age, the same factors that make nouns easy to learn are still at work; a constant situation becomes more easily attached to a verbalization than does a variable situation. At the nursery level, however, name-learning is no longer the most conspicuous feature of language development. The child is learning sentences as well as words; he is now learning verbalizations which refer to larger blocks of the whole situation than do the earlier learned names. For the nursery child, the permanent, durable, easily verbalized situations are those which are at hand; those situations which are referred to by the present, the present progressive, and the past and future tenses when these refer to the immediate future and past. Let us consider the concrete situations which call out the statements: "It is raining," "It has just stopped raining," "It rained last week," "Five years ago it rained all winter," "It rains a good deal here." Let us suppose that each statement has been made truthfully on several different occasions. The occasions which call out the sentence, "It is raining," will be much more like each other than will those which call out the statement, "It has just stopped raining." The situations which are associated with the latter sentence are in turn much more like each other than are those which are associated with general statements or with references to the remote past or future. Rain at the present moment gives a guarantee of a certain number of sights, sounds, and smells which will be substantially like each other

* It is true, of course, that the child has a smaller stock of *past* situations to draw from than the adult has.

every time the rain comes down. "Rain just over" means a much more scrappy and variable stimulus complex; while, with "Rain at a remote time," the concrete elements to which the verbalism must be tied are very fragile indeed.

It is usual to think of the present situation, referred to in the present tense, as being more vivid than a past or a remote situation. We must remember, however, that every remark is called out *in a present situation*, whatever its time-reference may be. Every stimulus that calls out speech is a stimulus from the present. There are no stimuli straight from the buried past and the veiled future. These are only stimuli which in some way refer to the past or future. In order for there to be any agreement in language usage, it is necessary for every remark referring to any past or future situation to be called out by certain more or less constant and durable features of that present situation. When the referent itself is present the situation is the more nearly constant on the occasions that the reference is made. We cannot say that the situations which call out reference to the past are any more or any less vivid than those which call out reference to the present.

It may be that egocentrism of the child is simply another name for this limitation of his activity to his immediate surroundings. The child is to himself the most conspicuous feature of his own immediate environment. Naturally, then, he makes a great many statements concerning himself and his own doings.

Summary: An analysis and description is presented of the grammatical forms used by 12 four year old children, with special emphasis on their use of verbs. For comparison, a sample of adult speech is analyzed in the same way. It is concluded from an examination of the children's speech records that the fact the content of their speech concerns itself with the present is because the stimuli which bring out speech responses to present situations are associated in more stable groups than are the stimuli which bring out speech responses to remote situations.

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SIMILARITIES AND DIFFERENCES IN THE PLAY ACTIVITIES OF CHILDREN IN TWO PUBLIC SCHOOLS WITH CONTRASTING ENVIRONMENT

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PURPOSE

Two public schools of strongly contrasting environments were chosen for this comparative study of the interests of children in their play activities. The survey was initiated in the fall of the year in the laboratory school "A" and completed in the spring of the year in school "B".

SOURCES OF DATA

School "A"

The laboratory school which included grades from kindergarten through high school was one of the public schools of the city and was conducted through the cooperation of the city school administration with the college authorities. It was across the street from the college campus. It was first occupied in 1929. It had ten acres of playing fields, a playground equipped with two jungle gyms, horizontal ladder, two slides, two teeter boards, and a hobby horse. It was a two story building including classrooms, work rooms, library, gymnasium, auditorium, and music room. Its staff was composed of teachers with masters' degrees. The equipment in the gymnasium included balls, mats, stall bars, rings, poles, jumping standards, and spring board. There were two teachers of physical education (a man and a woman), an instructor in art, one in music, and a nurse who spent half time at "A" and the remaining time in the college health service office, in addition to the regular staff of room teachers for each grade. A regular program of physical education began with the fourth grade but all grades were allowed time in the gymnasium. The program throughout the school encouraged the students to help conduct their community life. Opportunity was given for meetings in the auditorium, writing and producing their own plays, and exhibiting their art work.

The students came from many different kinds of homes. Restricted residential sections, faculty homes, comfortable, thrifty middle class homes, and the homes of struggling laborers with meager incomes comprised the background. There had never been a race problem. At the time this study was made there were no families on relief.

The occupations of the parents are demonstrated in Figure 1. Twenty-eight families from the trades classification designated the father a "factory worker" or "laborer". This number comprised 15% of the total group or 44% of the trades classification.

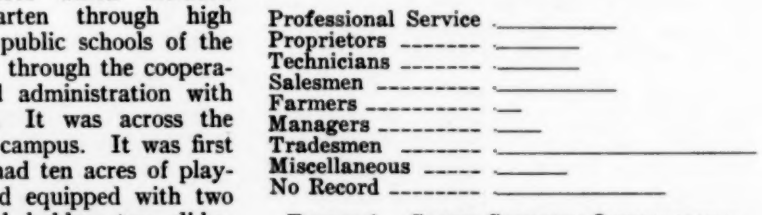

FIGURE 1.—GRAPH SHOWING OCCUPATIONAL PERCENTAGES.*

Table I designates the number of mothers employed. This work included teaching, laundering, conducting rooming houses for college students and one "spiritualist reader". Of the total group three fathers were unemployed. There were ten fathers deceased.

TABLE I

EMPLOYMENT OF MOTHERS

Fathers Unemployed, Mothers Employed	2
Fathers and Mothers Employed	11
Widows Employed	2
Total Mothers Employed	15

School "B"

School "B", having eight grades and being one of the public schools, was at the opposite edge of the town. It was a three story building standing in the center of a block. It was

* Classification partially suggested by George S. Counts, *The Selective Character of American Secondary Education*. The University of Chicago, 1922, pp. 21–25.

built in 1905. It had no playing field other than the school yard. It had no playground apparatus except goal posts for basketball. It was, however, across the street from the largest municipal park in the city which had well equipped playgrounds and which afforded additional playing space for the children if they wished to go there. The school had no directed physical education. The art and music work were directed by the city supervisors. A nurse in the city schools visited the building once a week. Forty-seven percent of the student body were negroes. Firty percent of the families were on relief. The school became the center for supplying the necessities of physical comfort which the homes were unable to provide. A barber (otherwise unemployed) was available two days per week. A shoe cobbler (otherwise unemployed) repaired shoes. Two showers were used each day by boys or girls. A washing machine and electric iron provided the necessary laundry. The principal was chairman of the Community Garden Committee which gave aid to worthy families.

Juvenile delinquency had been a problem. Three years prior to this study there had been fourteen cases on probation from the juvenile court. At the time this study was made there were only three. The principal acquainted himself with the activities of the students by walking down the alleys and out-of-the-way places in the vicinity of the school. The students played on junk piles, danced in the streets, sang, and played upon hand-made musical instruments. The students were invited to sing for the school. When they brought their musical instruments, these were found to be spare-ribs baked dry in the oven, and tobacco cans with rubber bands stretched across. The children danced. They sang negro spirituals; they sang solos about an undesired mother-in-law; they read their own poems. The school program was so flexible that if there were visitors the grades could be summoned to the hall to demonstrate their abilities.

"Going junking" was a behavior pattern which was difficult to eliminate. It meant playing around junk piles and sometimes taking parts to sell. Taking bicycles was another problem. The principal suggested the organization of a self-govornment committee to advise students who continued the habits of "going junking" and taking bicycles. This committee frequently inflicted severe punishment upon the offenders.

In School "B" it was impossible to compile a record of the occupations of the parents. Two factories furnished occupation for some, others found employment as porters, janitors in shops, and still others found odd jobs.

The Survey

The personal interview method was selected because it allowed direct contact with the children. The following list of questions with beginning and closing statements was used verbatim:

We are interested in knowing what you like to play.

1. What games do you like to play?
2. Who taught you these games?
3. What do you like to play when you do not play games?
4. Who taught you to do these things?
5. What do you do after school in the afternoon?
6. Do you have brothers and sisters to play with?
7. How many?
8. Are there children in the neighborhood to play with?
9. How many?

Thank you. That is all.

The children in both schools were apprised of the plan and were most cooperative.

This report includes the first six grades only.

Table II shows the total number of pupils in grades one to six in both schools.

Games

The games mentioned seemed to fall into five groups: (1) singing games, (2) traditional games, (3) newer games, (4) adult sports, and (5) card and table games. The singing games are traditional but they very clearly stand out as games with rhythmical accompaniment. The traditional games include those classic games of Hide-and-Seek, Tag, Blackman, and Blind Man's Buff. The newer games include Red Light, Tap on the Ice-box, Indian Ball, Jacks, Squirrel and Nut, and Squirrels in Trees. These games are fragments of the traditional games with new names. It seems legitimate to acknowledge the evident influence of contemporary life upon the changing pattern of child play.

TABLE II

TOTAL NUMBER OF PUPILS IN GRADES ONE TO SIX

	School "A"			School "B"					Total
				Negro		White			Both
	Boys	Girls	Total	Boys	Girls	Boys	Girls	Total	Schools
First	34	18	52	8	10	12	16	46	98
Second	24	26	50	14	14	9	10	47	97
Third	21	23	44	10	9	12	22	53	97
Fourth	33	34	67	4	12	2	16	34	101
Fifth	11	14	25	14	10	13	9	46	71
Sixth	15	17	32	9	13	15	9	45	77
Totals	138	132	270	59	67	63	82	271	541

Adult sports are Basketball, Tennis, Baseball, and Football. Card and table games include Checkers, Bridge, Seven Up, and Dominoes.

A complete list of the games preferred by each grade was made showing the number of times each was chosen. The percentage was established by finding the relationship between the number of times a type game was chosen within the total number of games for each grade. Table III represents a comparison of Schools "A" and "B" in division of interests for each grade. For example, 16% of the games preferred by grade one, School "A" were singing games, while 34% chosen by grade one, School "B" were singing games.

Table III designates, by percentages, the comparative interest in the type games at the two schools.

TABLE III

COMPARISON OF INTEREST IN SCHOOLS "A" AND "B"

FOR TYPE GAMES BY GRADES

Grades	Schools	Singing Games	Traditional Games	Newer Games	Adult Sports	Card-Table Games
1	A	16	38	25	14	7
	B	34	37	21	5	3
2	A	8	39	20	23	10
	B	23	28	32	16	1
3	A	12	34	16	32	6
	B	17	40	26	16	1
4	A	2	40	29	27	2
	B	14	49	24	12	1
5	A	2	41	39	20	8
	B	3	48	14	33	2
6	A	1	18	21	47	13
	B	1	43	12	44	0

TABLE IV

COMPARISON OF RACE INTERESTS

FOR TYPE GAMES BY GRADES IN SCHOOL "B"

Grades	Races	Singing Games	Traditional Games	Newer Games	Adult Sports	Card-Table Games
1	Negro	16	34	10	2	0
	White	17	24	12	3	3
2	Negro	15	15	15	8	1
	White	8	13	17	8	0
3	Negro	7	17	10	8	0
	White	10	23	17	8	0
4	Negro	7	22	10	7	0
	White	8	27	14	4	1
5	Negro	2	21	6	21	2
	White	1	27	8	12	0
6	Negro	0	22	4	20	0
	White	1	22	7	24	0

It will be noted that the singing games were in greater favor at School "B"; that this type activity was in greater favor in the lower level but declined with the advancing maturity of experience.

The traditional games were in great favor at both schools but became predominant in the upper level at School "B".

The newer games were in favor at both schools but gained in the upper levels at School "A".

The adult sports were in marked favor at School "A" but this experience gained favor in the upper levels in School "B".

The card and table games were in marked and consistent favor at School "A".

It will be noted from the foregoing table that the play behavior at School "B" was not dominated by the interests of the negro.

The following table shows two outstanding points: (1) Girls at School "A" favored singing and traditional games more than boys and retained the interest throughout the grades; (2) Boys at School "A" very markedly favored adult sports.

Three outstanding factors are shown in Table VI: (1) Girls at School "B" favored singing, traditional and newer games more often than boys; (2) Boys favored adult sports; (3) Card and table games were shown scant favor.

TABLE V

COMPARISON OF SEX INTERESTS

FOR TYPE GAMES BY GRADES AT SCHOOL "A"

Grades	Sexes	Singing Games	Traditional Games	Newer Games	Adult Sports	Card-Table Games
1	Boys	7	23	13	13	4
	Girls	9	16	11	1	3
2	Boys	0	18	8	15	4
	Girls	8	21	12	7	7
3	Boys	3	17	11	25	4
	Girls	9	17	5	7	2
4	Boys	0	20	15	19	1
	Girls	2	20	14	8	1
5	Boys	0	9	25	18	0
	Girls	2	22	14	2	8
6	Boys	0	5	5	35	0
	Girls	1	13	17	3	0

School "B" had a high percentage of negroes who might have had some influence upon the play patterns of that school. Table IV shows the comparison between the races in their play preferences.

The comparison of the two schools in these tables shows that: (1) Girls at both schools favor singing and traditional games. The preference for these activities was greater at School "B" than at School "A". (2) Boys

TABLE VI

COMPARISON OF SEX INTERESTS

FOR TYPE GAMES BY GRADES AT SCHOOL "B"

Grades	Sexes	Singing Games	Traditional Games	Newer Games	Adult Sports	Card-Table Games
1	Boys	9	24	9	4	2
	Girls	24	13	13	1	1
2	Boys	8	12	13	15	0
	Girls	16	16	18	1	1
3	Boys	1	17	9	12	0
	Girls	17	23	17	4	0
4	Boys	2	11	3	8	0
	Girls	13	38	21	3	1
5	Boys	0	24	3	24	2
	Girls	3	24	11	9	0
6	Boys	0	21	6	26	0
	Girls	0	23	3	19	0

at both schools favored adult sports. (3) Card and table games were found in greater frequency at School "A". (4) Interest in newer games showed a noticeable acceleration in the fourth grade at School "A".

The similarities and differences in first choice games at the two schools are shown in Tables VII to XIV inclusive. They emphasize these points:

1. There is in this instance a continuity of interests very similar in both schools.

2. The entrance of Spud and Ring Tennis at School "A" suggests an influence contrary to the traditions.

3. Football was a major sport at the college and its dramatic interest was absorbed by the laboratory school.

4. Jacks was mentioned but once at School "A". It appeared to be a definite behavior pattern at School "B".

5. Baseball was a major sport in the park near School "B". It, like football at School "A", was absorbed by School "B".

TABLE VII

FIRST CHOICE GAMES—SCHOOL "A"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card and Table Games
1	Farmer in Dell	Hide and Go Seek	Hiding Objects	Football	Checkers
2	Ring Round Roses	Hide and Go Seek	Tap on Ice Box	Football	Dominoes
3	Farmer in Dell	Hide and Go Seek	Tap on Ice Box	Football	Checkers
4	Sally Walker	Tag	Tap on Ice Box	Football	Checkers
5		Hide and Go Seek	Spud	Football	Checkers
6		Hide and Go Seek	Ring Tennis	Baseball	Checkers

TABLE VIII

FIRST CHOICE GAMES—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card & Table Games
				Baseball	
1	Ring Round Roses	Hide and Go Seek	Jacks	Basketball	
2	Ring Round Roses	Hide and Go Seek	Jacks	Basketball	
3	Farmer in Dell	Hide and Go Seek	Jacks	Basketball	Lotto
4	Farmer in Dell	Hide and Go Seek	Jacks	Baseball	
5		Hide and Go Seek	Jacks	Baseball	Checkers
6		Hide and Go Seek	Jacks	Baseball	

TABLE IX

FIRST CHOICE GAMES OF NEGROES—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card and Table Games
				Baseball	
1	Ring Round Roses	Tag	Jacks	Tennis	
2	Ring Round Roses	Hide and Go Seek	Jacks	Basketball	
3	Ring Round Roses	Hide and Go Seek	Jacks	Basketball	Lotto
				Baseball	
4	Ring Round Roses	Hide and Go Seek	Jacks	Basketball	
5		Hide and Go Seek	Jacks	Baseball	Checkers
6		Hide and Go Seek	Jacks	Baseball	

TABLE X

FIRST CHOICE GAMES OF WHITE CHILDREN—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card & Table Games
1	Ring Round Roses	Hide and Go Seek			
2	Farmer in Dell	Hide and Go Seek			
3	Farmer in Dell	Tag	Hiding Objects	Basketball	
4	Farmer in Dell	Tag	Hiding Objects		
5		Hide and Go Seek	Redlight	Baseball	
6		Hide and Go Seek			

TABLE XI

FIRST CHOICE GAMES OF BOYS—SCHOOL "A"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card and Table Games
1	Farmer in Dell	Hide and Go Seek	Hiding Objects	Football	Checkers
2	Ring Round Roses	Hide and Go Seek	Redlight	Football	
3		Hide and Go Seek	Redlight	Football	Old Maid
4		Tag	Tap on Ice Box	Football	
5		Hide and Go Seek	Battle Ball Kickball	Football	
6		Hide and Go Seek	Ring Tennis	Football	

TABLE XII

FIRST CHOICE GAMES OF BOYS—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card & Table Games
1	Ring Round Roses	Hide and Go Seek	Indian Ball Tap on Ice Box	Baseball	
2	Ring Round Roses	Hide and Go Seek	Hiding Objects	Basketball	
3		Hide and Go Seek	Tap on Ice Box	Basketball	
4	Ring Round Roses	Hide and Go Seek	Tap on Ice Box	Basketball Baseball	
5		Blackman	Tap on Ice Box	Baseball	
6		Hide and Go Seek	Marbles Indian Ball Tap on Ice Box	Baseball	

TABLE XIII

FIRST CHOICE GAMES OF GIRLS—SCHOOL "A"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card and Table Games
1	Farmer in Dell	Hide and Go Seek	Hiding Objects		Checkers
2	Ring Round Roses	Hide and Go Seek	Hiding Objects	Football	Casino Old Maid
3	London Bridge Farmer in Dell	Hide and Go Seek		Golf	
4	Ring Round Roses Sally Walker	Tag	Spud	Baseball	
5		Tag	Spud		
6		Hide and Go Seek	Uncle Wiggly Tap on Ice Box	Baseball	Rook Parchesi

TABLE XIV

FIRST CHOICE GAMES OF GIRLS—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card & Table Games
1	Ring Round Roses	Hide and Go Seek	Jacks	Basketball	
2	Farmer in Dell	Hide and Go Seek	Jacks	Tennis	
3	Farmer in Dell	Hide and Go Seek	Jacks	Basketball	
4	Farmer in Dell	Hide and Go Seek	Jacks	Baseball	
5		Hide and Go Seek	Jacks	Baseball	
6		Hide and Go Seek	Jacks	Baseball	

Second choice games at both schools are shown in Tables XV to XXI, inclusive. These also emphasize the similarity in continuity of interests for both schools. In addition to this they emphasize the non-seasonal interest in the adult sports.

The following tables of first and second choice games for the negro and white children, for boys and girls, show one major trend—namely, that Jacks is favored by negro girls to such an extent as to influence the total response of the entire school.

TABLE XV

SECOND CHOICE GAMES—SCHOOL "A"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card and Table Games
1	Ring Round Roses	Tag	Tap on Ice Box	Baseball	Dominoes
2	Farmer in Dell	Tag	Redlight	Baseball	Casino Old Maid
3	Ring Round Roses London Bridge	Tag	Redlight May I?	Baseball	Old Maid
4	Farmer in Dell	Hide and Go Seek	Batball	Basketball	Tiddlewinks
5		Tag	Tap on Ice Box	Basketball	Old Maid
6		Tag	Tap on Ice Box	Basketball Football	Rook

TABLE XVI

SECOND CHOICE GAMES—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card & Table Games
1	Farmer in Dell	Tag	Tap on Ice Box	Tennis	
1	Farmer in Dell	Tag	Hiding Objects	Baseball	
3	Ring Round Roses	Tag	Tap on Ice Box	Baseball	
4	Ring Round Roses Johnny Go Round	Tag	Hiding Objects	Basketball	
5		Blackman	Tap on Ice Box	Basketball	
6		Blackman Tag	Marbles	Basketball	

TABLE XVII

SECOND CHOICE GAMES OF NEGROES—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card and Table Games
1	Farmer in Dell London Bridge	Hide and Go Seek			
2	Farmer in Dell	Tag	Hiding Objects	Basketball	
3	Farmer in Dell	Blackman	Redlight Marbles Tap on Ice Box	Baseball	
5	Johnny Go Round Farmer in Dell	Tag	Redlight Hiding Objects		
5		Blackman	Tap on Ice Box	Basketball	
6		Tag		Basketball	

TABLE XVIII

SECOND CHOICE GAMES OF WHITE CHILDREN—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card & Table Games
1	Farmer in Dell	Tag	Tap on Ice Box		
2	Ring Round Roses	Tag	Hiding Objects		
3		Hide and Go Seek	Tap on Ice Box		
4		Hide and Go Seek			
5		Tag			
6		Tag		Basketball	

TABLE XIX

SECOND CHOICE GAMES OF BOYS—SCHOOL "A"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card and Table Games
1	Ring Round Roses	Tag	Tap on Ice Box	Baseball	Dominoes
2		Tag		Baseball	
3		Tag	Tap on Ice Box	Baseball	
4		Hide and Go Seek	Bat Ball	Basketball	
5		Tag	Spud	Baseball	
6		Hide and Go Seek		Basketball	

TABLE XX

SECOND CHOICE GAMES OF BOYS—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card & Table Games
1	Johnny Go Round	Tag			
2	Farmer in Dell Here We Go Round	Tag	Tap on Ice Box Marbles Bingo	Baseball	
3		Blackman	Hiding Objects	Baseball	
4				Football	
5		Hide and Go Seek		Basketball	
6		Blackman		Basketball	

TABLE XXI

SECOND CHOICE GAMES OF GIRLS—SCHOOL "B"

Grade	Singing Games	Traditional Games	Newer Games	Adult Sports	Card and Table Games
1	Farmer in Dell	Tag	Tap on Ice Box		
2	Ring Round Roses	Tag	Hiding Objects		
3	Ring Round Roses	Tag	Hiding Objects		
4	Ring Round Roses Johnny Go Round	Tag	Hiding Objects		
5		Tag	Tap on Ice Box Redlight	Basketball	
6		Tag	Hiding Objects	Basketball	

OTHER PLAY ACTIVITIES

The activities which the students named spontaneously as their preferred non-game activities grouped themselves under nine headings:

1. Big muscle (gross body movements such as running.)
2. Apparatus, park (playground at School "A", park at School "B".)
3. Creative (construction, drawing, painting.)
4. Dramatic (cowboy, Indian.)
5. Toys.
6. Pets.
7. Music.
8. Seasonal.
9. Miscellaneous.

The lists of "other play activities" included 990 and 924 items in the two respective schools. Table XXII shows the frequency of the various groupings, in percentages.

TABLE XXII

COMPARISON OF INTEREST FOR NON-GAME ACTIVITIES BY GRADES—SCHOOLS "A" AND "B"

Grade	School	Big Muscle	Apparatus Park	Creative	Dramatic	Toys	Pets	Music	Seasonal	Miscellaneous
	A	20	14	9	11	26	1	1	1	1
1	B	23	9	5	11	18	1	3	0	0
	A	20	8	20	10	10	1	2	1	1
2	B	36	3	6	15	15	1	4	0	0
	A	27	22	13	16	10	2	2	0	0
3	B	26	7	6	12	21	0	3	0	0
	A	26	8	25	17	12	0	6	2	2
4	B	28	9	11	9	9	0	2	0	0
	A	50	1	11	15	6	2	0	0	0
5	B	30	5	11	5	20	3	2	0	0
	A	26	6	15	6	6	4	7	4	4
6	B	43	6	6	6	3	0	5	0	0

The preceding table shows these points predominating:

1. The apparatus of School "A" playground might be judged of greater importance than the park adjacent to School "B".

2. Creative work at School "A" was in constant favor. This suggests that the availability of the hammer, saw, paint brush, and easel had had an influence upon the interests of the children.

3. School "A" showed a continuously diminishing interest in toys. Of these toys the airplane was mentioned in every grade at School "A" except in the sixth where the parachute superseded it. The airplane was a toy or an object of creative effort or a reading interest. This subject was mentioned twice at School "B". Kites were named in each grade at School "B" except the first but not at all at School "A". This was very distinctly a seasonal influence.

There were five items in the big muscle group which stood out above all others. They were (1) Jump the Rope, (2) Play Ball, (3) Skate, (4) Ride Tricycle or Bicycle, and (5) Do Stunts. The percentage groupings of these activities are demonstrated in Table XXIII. It may be noted that School "B" showed a marked and consistent preference for Jump the Rope. It may also be noted that Skating was a preferred activity in all grades except the fifth at School "A". Play Ball may have meant a special game, but the casual title indicated no preferred game. It was in marked and consistent favor at School "B". The marked acceleration in interest at School "B" for Riding a Bicycle in the fifth and sixth grades might have been connected with the major behavior problems of "going junking" and taking bicycles. The marked and consistent interest in Doing Stunts at School "A" might have been traced to the availability of a well equipped gymnasium and a planned program of activity.

These comparisons suggest the possibility of race and sex differences. Table XXIV shows a comparison of the negro and white children's interests in these five special big muscle activities in School "B". It indicates no consistent harmony in race preferences at that school.

TABLE XXIII

COMPARISON OF PREFERENCES FOR SPECIAL BIG MUSCLE ACTIVITIES IN SCHOOLS "A" AND "B"

Grade	School	Jump Rope	Play Ball	Skate	Ride Bicycle	Do Stunts
1	A	4	8	25	11	18
	B	36	26	6	2	0
2	A	5	12	7	7	4
	B	40	24	2	5	0
3	A	0	12	8	12	14
	B	38	30	4	0	0
4	A	4	4	25	10	10
	B	45	18	0	3	0
5	A	3	17	12	6	53
	B	17	20	15	26	0
6	A	0	4	16	0	24
	B	20	18	12	8	0

TABLE XXIV

COMPARISON OF RACE PREFERENCES FOR SPECIAL BIG MUSCLE ACTIVITIES BY GRADES AT SCHOOL "B"

Grade	Race	Jump Rope	Play Ball	Skate	Ride Bicycle	Do Stunts
1	Negro	14	12	4	0	0
	White	22	14	2	2	0
2	Negro	26	20	2	5	0
	White	14	4	0	0	0
3	Negro	12	12	2	0	0
	White	26	18	2	0	0
4	Negro	21	15	0	0	0
	White	24	3	0	3	0
5	Negro	11	9	6	11	0
	White	6	11	9	15	0
6	Negro	10	12	10	4	0
	White	10	6	2	4	0

Table XXV, comparing the sex interests for these special big muscle activities in School "B", shows the interests of girls in overwhelming favor of Jump the Rope. Here again are shown the interests of the boys in the upper levels for riding a bicycle.

TABLE XXV

COMPARISON OF SEX PREFERENCES FOR SPECIAL BIG MUSCLE ACTIVITIES BY GRADES AT SCHOOL "B"

Grade	Sex	Jump Rope	Play Ball	Skate	Ride Bicycle	Do Stunts
1	Boys	16	12	2	2	0
	Girls	20	14	4	0	0
2	Boys	10	7	0	2	0
	Girls	30	17	2	3	0
3	Boys	2	16	4	0	0
	Girls	36	14	0	0	0
4	Boys	0	6	0	3	0
	Girls	45	12	0	0	0
5	Boys	0	18	9	22	0
	Girls	17	2	6	4	0
6	Boys	0	12	4	6	0
	Girls	20	6	8	2	0

Table XXVI compares the sex interests at School "A" in these same activities and brings forward the following points: Girls

more often than boys preferred Jump The Rope; and they demonstrated the influence of their planned gymnasium program in their interest in stunts.

TABLE XXVI

COMPARISON OF SEX PREFERENCES FOR SPECIAL BIG MUSCLE ACTIVITIES BY GRADES AT SCHOOL "A"

Grade	Sex	Jump Rope	Play Ball	Skate	Ride Bicycle	Do Stunts
1	Boys	0	2	15	5	6
	Girls	4	6	10	6	12
2	Boys	5	6	7	5	0
	Girls	0	6	0	2	4
3	Boys	0	8	2	8	2
	Girls	0	4	6	4	12
4	Boys	0	2	14	8	2
	Girls	4	2	11	2	8
5	Boys	0	11	3	3	3
	Girls	3	6	9	3	50
6	Boys	0	0	0	0	0
	Girls	0	4	16	0	24

TEACHING SOURCES

The casual answers to the questions on teaching sources fell into the divisions listed in Table XXVII. The first four items, family and parents, school, playmates, and siblings, were the most prominently named, but of these, the school was less so than the others. The school became more prominently identified with the learning of skills at School "A" in the fourth grade. The consistent acknowledgement of learning by oneself was demonstrated at School "B". Playmates and siblings were, in these two schools, most prominently identified with furthering the play activities.

AFTER SCHOOL ACTIVITIES

After school was a time for helping with the family responsibilities in many instances, especially in the case of the children in School "B". Table XXVIII shows the percentage of children who reported that they had work to do at home after school.

Table XXIX gives the list and placement of work mentioned.

TABLE XXVIII

COMPARISON OF PERCENTAGE WHO WORK AT SCHOOLS "A" AND "B"

	School "A"	School "B"
Grade One	13	35
Grade Two	10	60
Grade Three	5	19
Grade Four	9	79
Grade Five	4	91
Grade Six	3	75

TABLE XXVII

COMPARISON OF REFERENCES TO TEACHING SOURCES

Source	School	Grade 1	2	3	4	5	6
Family, Parents	A	23	35	19	11	14	17
	B	17	32	23	16	18	6
School	A	17	4	0	26	36	24
	B	26	13	10	16	9	18
Playmates	A	29	31	31	28	17	30
	B	17	13	29	37	44	36
Siblings	A	27	20	17	19	17	10
	B	40	32	26	19	22	16
Movie, Radio	A	2	2	0	1	3	0
	B	0	0	0	0	0	0
Sunday School	A	2	0	0	0	0	0
	B	0	2	0	0	0	0
Self	A	0	0	2	7	0	0
	B	0	8	7	5	3	10
Watched Others	A	0	6	10	4	10	10
	B	0	0	3	2	0	1
Parties	A	0	2	0	2	0	0
	B	0	0	0	0	0	1
Books, Reading	A	0	0	2	1	0	2
	B	0	0	1	0	0	0
People	A	0	0	0	0	3	3
	B	0	0	1	0	4	0
Just Knew How	A	0	0	0	0	0	4
	B	0	0	0	2	0	1
Y M C A	A	0	0	0	0	0	0
	B	0	0	0	3	0	3
Camp	A	0	0	0	1	0	0
	B	0	0	0	0	0	0

TABLE XXIX

CHORES MENTIONED IN SCHOOLS "A" AND "B"

Chore	School "A" Grade						School "B" Grade					
	1	2	3	4	5	6	1	2	3	4	5	6
Help mother	•	•	•				•	•	•	•	•	•
Set table		•		•			•	•		•	•	
Carry in fuel							•	•	•	•	•	•
Wash dishes	•	•	•	•			•	•	•	•	•	•
Take care of baby							•	•	•	•	•	•
Sweep floor		•				•	•	•	•	•	•	•
Make garden							•		•	•	•	
Make beds							•	•	•	•		
Make fire							•					
Run errands		•					•	•	•	•	•	•
Wash clothes							•			•	•	
Peel potatoes							•					
Clean house	•			•				•	•	•	•	•
Dust								•	•	•	•	
Carry water								•	•		•	•
Work in people's houses								•				
Pack lunch								•				
Carry out ashes								•			•	•
Hang up clothes								•		•		
Cook				•		•			•	•	•	•
Cut wood				•							•	•
Clean yard									•	•		•
Mow grass									•		•	
Feed chickens										•		
Help father			•		•				•		•	
Go after washing									•	•		•
Put away playthings										•		
Iron										•		
Pick greens					•					•		
Night work										•		•
Work at grocery										•		
Pull weeds											•	
Sew											•	
Raise rabbits											•	
Mow golf course											•	
Go after milk											•	•
Work for a lady												•
Pick beans for factory												•
Have paper route												•
Clesn bedroon												•
Care for goose												•
Do odd jobs												•
Use electric sweeper	•											
Like to help	•											
Watch sister in high chair		•	•									
Chores on Saturday			•									
Work			•	•								

SUMMARY

Deductions From Survey

The similarities in the play activities of the children in these two schools were greater than their differences. The unchanging continuity of traditional childhood play, upon which season, race, economic level left but slight impression, demonstrated the favor of the old responses. The predominance of traditional forms of play behavior in the lower levels of both schools suggested that the teaching procedures had been similar in the two schools, that is, let the children carry on their own play activities as they will. This point was corroborated by subsequent observations.

The prevalence of singing games in child play shows in small measure the appeal of rhythmic experience, the only rhythmic experience which the child may foster by himself without adult aid. The traditional games, replete with examples of immemorial re-

sponses in chasing, fleeing, hunting, hiding, taunting, capturing, are the oldest and most classic examples of child play. They are the most remote forms of suggested adult responses. The newer games definitely show the influence of contemporary civilization in names, planned organization and adjustment to current school necessities. Their kinship to the traditional games is very close. The adult sports are the renowned and colorful major sports of college and adult life. The card and table games are those forms of strategy and wit displayed over cards, dominoes, dice and checkers by small groups around a table.

The similarity in response to the first three type games demonstrates the type of activity that these children could foster by themselves. The evidence as to sources of learning corroborates this point, for the predominating influence was that of playmates and siblings.

There was a similarity in the responses of the sexes, indicating a longer period for traditional experience for the girls and the continuous endeavor of the boys to grasp adult forms.

The similarities of preferences allowed very few seasonal influences. The most marked was that for "kites".

For both schools the greatest number of preferences centered upon a comparatively short list of favored activities.

The differences were to be noted in the fringes of the play rather than its core. The more expansive curriculum at School "A", where there were more materials to work with, reflected evidences of contemporary life in daily use. The children at School "A" referred both directly and indirectly to art and physical education as integral parts of school experience. The freedom of the flexible program at School "B" had not altered the stronger adherence to tradition. The evidences of contemporary forms of play in the fourth grade at School "A" suggest the possibility of the influence that the curriculum may have in directing attention from the traditional forms.

A very marked difference resided in the after school activities of the children. The family dependence upon the children at School "B" for helping protect the family life is evidenced in their chores, which were numerous in all grades.

Another difference lay in the favor for card and table games at School "A". Girls in the sixth grade were organized for a bridge club. This preference was an expression of the different family life for the majority of children at School "A". Adult recreation as a part of family experience was absent at School "B".

The contrasting environments of the two schools suggest the economic basis of cultural patterns. The low economic level at School "B" left children to their own devices, fostered almost exclusively traditional forms of play behavior and was resistant to changing patterns. This also demonstrated a family life of physical dependence and intellectual separation.

The higher economic level at School "A" gave the students a more highly stimulating atmosphere where adults and children often mingled together in a cooperative endeavor. This fostered the apparent eagerness of the children to grasp adult forms of behavior very early in life.

Several questions emerged from this study. Should these rich years of the lower level be left to the traditional forms of play behavior? Are there not contemporary forms equally as satisfying? Must there necessarily be a difference between the philosophies of teaching procedures for the lower and higher levels of the elementary schools? And what part does the school play in balancing these economic differences?

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